AUGUST, 1955

APR 1

PIPE LINE INDUSTRY

Gulf Publishing Company

CONSTRUCTION • OPERATIONS • MAINTENANCE

ONE COPY SENT TO L. C.

A SYMPOSIUM

on

GAS PIPE LINE TESTING

A panel of testing engineers from the gas industry discusses the latest in pressure and leak testing. For a discussion of the three methods—gas, hydrostatic and high-pressure air, turn to Page 20.

Turn page for additional contents and a Quick Review of this issue

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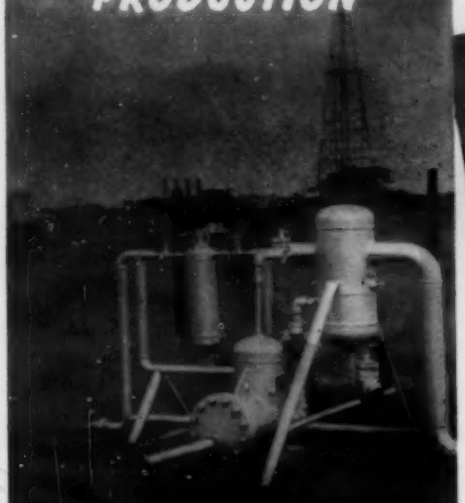
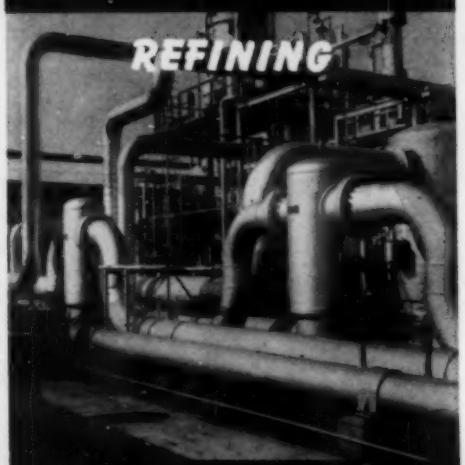
PRODUCTION



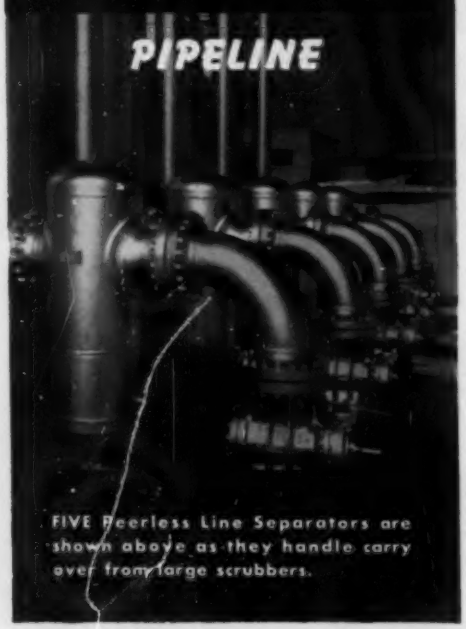
Pictured above is a Peerless Line Separator removing moisture from fuel to drilling rig.

REFINING



These two Peerless Line Separators are doing an efficient job of mist extraction in the Petrochemical plant in Kentucky.

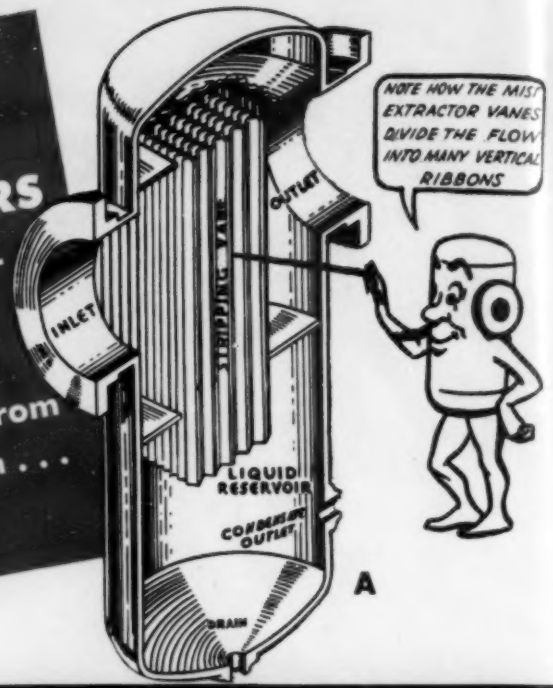
PIPELINE

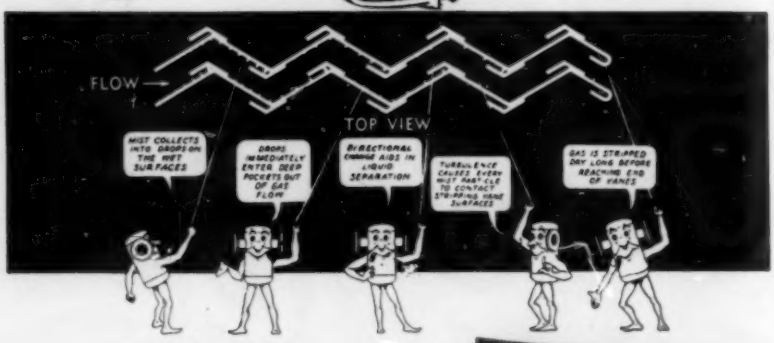


FIVE Peerless Line Separators are shown above as they handle carry over from large scrubbers.

PEERLESS LINE SEPARATORS

Outstanding for the efficient extraction of liquid mist from gas or steam . . .




B
FLOW
TOP VIEW
MIST COLLECTS INTO DROPS ON THE WET SURFACES
DROPS IMMEDIATELY ENTER DEEP POCKETS OUT OF GAS FLOW
BIDIRECTIONAL CHANNELS AIDS IN LIQUID SEPARATION
TURBULENCE CAUSES EVERY MIST PARTICLE TO CONTACT STRIPPING VANE SURFACES
GAS IS STRIPPED DRY LONG BEFORE REACHING END OF VANES

HIGH EFFICIENCY — HIGH CAPACITY LOW PRESSURE DROP

Thousands of installations throughout the oil industry . . . production, pipeline, refining and petrochemical . . . prove the Peerless Line Separator principle to be one of the most outstanding methods available for the extraction of liquid gas, steam or air.

Drawing A above shows the arrangement of the vanes in the Separator. Drawing B is an illustration of the Peerless Principle.

The mist extractor combines the forces of impingement, centrifugal motion and surface tension to obtain its high efficiency. The path of the gas, etc., through the unit is constantly bending causing semi-violent turbulence and rolling of the gas against the walls of the vane. Impingement and centrifugal force combine to contact the droplets with the vanes, where they coalesce, and surface tension then causes them to cling to the vane's surfaces. Gravity and the impact of the gas steam then drive the droplets into the pockets where they roll down the vanes and out of the gas stream.

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AUG 10 1955

PIPE LINE INDUSTRY

CONTENTS and Quick Review

August, 1955 Vol. 3, No. 2

To help you put first things first, scan these time-saving digests, checking ☑ those you want to read first.

What's ahead . . .

A full fare of editorial delicacies has been lined up for PIPE LINE INDUSTRY *readers during the coming months.*

SEPTEMBER—Next month's issue will be devoted to maintenance of contractor equipment and station equipment. Don't miss the many new ideas on maintenance that will be included in the Maintenance Issue.

NOVEMBER—Coming up in November will be the Modern Station Design Issue. This issue will be concerned with trends in oil, gas, and product station designs.

These issues are good examples of why PLI is the "idea" magazine for men in pipe line construction, operation, and management.

EVERY MONTH—Look for the valuable editorial features listed below in each monthly issue of PIPE LINE INDUSTRY.

DEPARTMENTS

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A Symposium on Gas Pipe Line Testing

☐ Some leading engineers from the gas pipe line industry got together recently at Texas A. & I. College in Kingsville, Texas, to discuss the latest innovations in pressure and leak testing. PLI has compiled what they had to say about the three methods—gas, hydrostatic, and high-pressure air.

By L. C. Poindexter, Gene Proper and Sy Orlofsky ..... Page 20

How to Calculate Gas Line Flow Efficiencies

☐ Every pipe line company has a different problem in calculating flow efficiencies. The variation is there even though the companies may use the same formula. Texas Eastern Transmission Corporation uses a version of the Panhandle formula.

Merle S. Greaves ..... Page 30

Junk Isn't Junk . . . at Texas Gas' Benoit Station

☐ A closer look at the station junk pile could save you money on maintenance. One salvage job at Texas Gas Transmission Corporation's Benoit station yielded 24 reclaimed sets of engine power rod packing worth $100 each ..... Page 34

How to Modernize a Pump Station

☐ Compact, electrically-powered, automatically-operated pump stations were installed to replace two veteran stations on Service Pipe Line Company's system. Only one operator per tour is required to operate these pacesetters in modern design.

By Carl I. Huss ..... Page 36

Presenteeism Can Be Increased

☐ Avoidable absenteeism among employes is caused to a considerable extent by conditions that can be controlled or influenced by management. Careful studies of absenteeism by managers will shed light on the causes involved. Knowing the causes, a manager can act to discourage absenteeism.

By Auren Uris ..... Page 41

How to Control Fire During Pipe Line Tie-Ins

☐ There are two ways to control fire during pipe line tie-ins. One is to completely purge the line of inert gas prior to beginning work. The second method is to control the amount of leakage around the open cut through a stack valve. This method, called fire control, is discussed in this issue.

By G. Chabre ..... Page 44

Daily Bulletin Aids Communications

☐ It's time wasted when you go looking for a fellow employe who is out of town . . . or telephone someone about the weather forecast . . . or ask about construction progress on a company project. Time wasted, that is, if it's all there on your desk, wrapped up in a Daily Bulletin. Here's a technique that you may want to adopt.

By R. H. Lewis ..... Page 50

PIPE LINE INDUSTRY published every month. Entered as second class mail matter July 9, 1954, at the post office at Houston, Texas, under the act of March 3, 1879.

Oil Need Not Fear Atomic Energy

Atomic energy can be expected to experience a fairly rapid rate of growth in the years ahead. Electric power from nuclear reactors will be available in the U. S. within a few years. Other installations like the one under construction by Duquesne Power Company at Pittsburgh, Penn., will be built. It has been predicted that one out of every three new electric generating plants will be of the nuclear type in the future.

It also seems probable that atomic power for ships may begin to find practical application within a few years. Other uses also can be expected to be developed.

However, the petroleum industry need not become alarmed over these prospects. The consumption of oil can be expected to continue to expand at very substantial rates as far ahead as we can see.

•

There is going to be such a tremendous increase in total energy requirements of the world that there will be plenty of room for atomic power and all other power sources. A continued big-scale growth in petroleum consumption seems assured.

M. J. Rathbone, president, Standard Oil Company (New Jersey), has predicted that energy consumption in the U. S. will grow by 63 percent by 1975. After allowing for a fairly rapid nuclear power rate of growth, Rathbone foresaw the atom's contribution to U. S. over-all energy needs in 1975 as amounting to only 1½% of the total power consumption of the country.

Nuclear fuels probably will find their greatest use in the electric power generation field. Other potential energy sources, such as solar energy, heat pumps, etc., will not be contributing more than a negligible amount of the total U. S. energy picture. Hydro-electric power will have only moderate expansion. Coal may recover a little of its lost ground. Natural gas in another five years or so will not be growing so rapidly, as reserves are depleted and prices tend to rise. This leaves oil to supply much of the increased energy that will be consumed in the U. S. Old uses for oil are still growing at rapid rates. In addition, new uses are constantly being developed.

Thus, it is indicated that consumption of oil in the U. S. is to continue to grow in the future. Rathbone forecast that the U. S. would be consuming 13⅓ million barrels of oil by 1975. Some others have predicted as much as 15 million barrels. These figures compare with present consumption of a little over 8 million barrels daily.

Equally impressive gains in oil consumption can be expected outside the U. S. Western Europe and Latin America are turning more and more to oil as a source of energy. Population in these areas is growing faster than ever before. At the same time, per capita consumption is increasing sharply as nations in these areas become more industrialized and mechanized. Rathbone has predicted that consumption of Western Europe and Latin America will reach 7¾ million barrels daily in 1975. Current consumption is only 3⅓ million barrels per day.

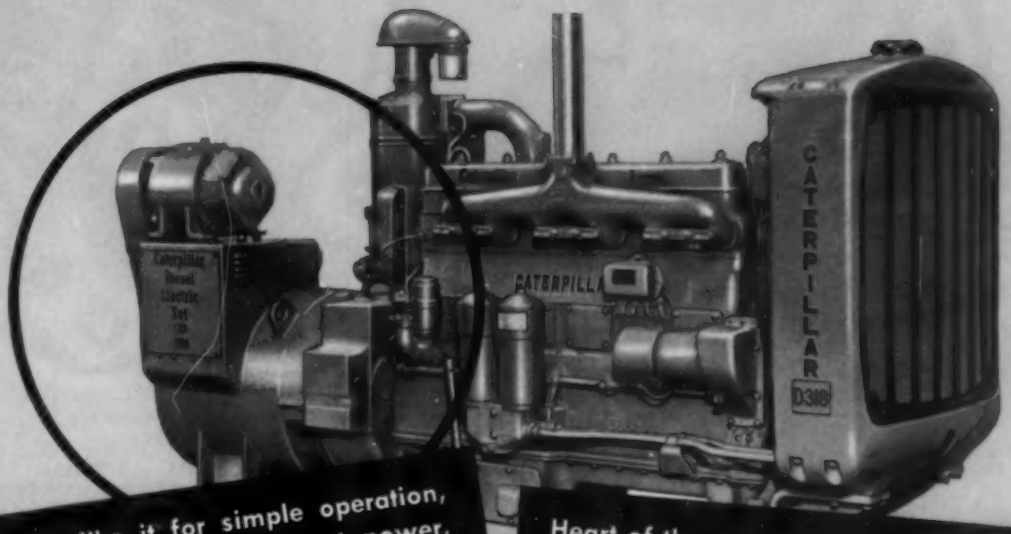
•

These conditions indicate that further vigorous expansion will take place in the consumption of oil during the next 20 years. Petroleum need not fear the entrance of atomic energy. Power requirements of the world will expand so greatly during the next 20 years that there will be plenty of room for all forms of energy.

Warren L. Baker

A MAJOR DEVELOPMENT IN MODERN ELECTRIC POWER

NEW CAT* GENERATOR



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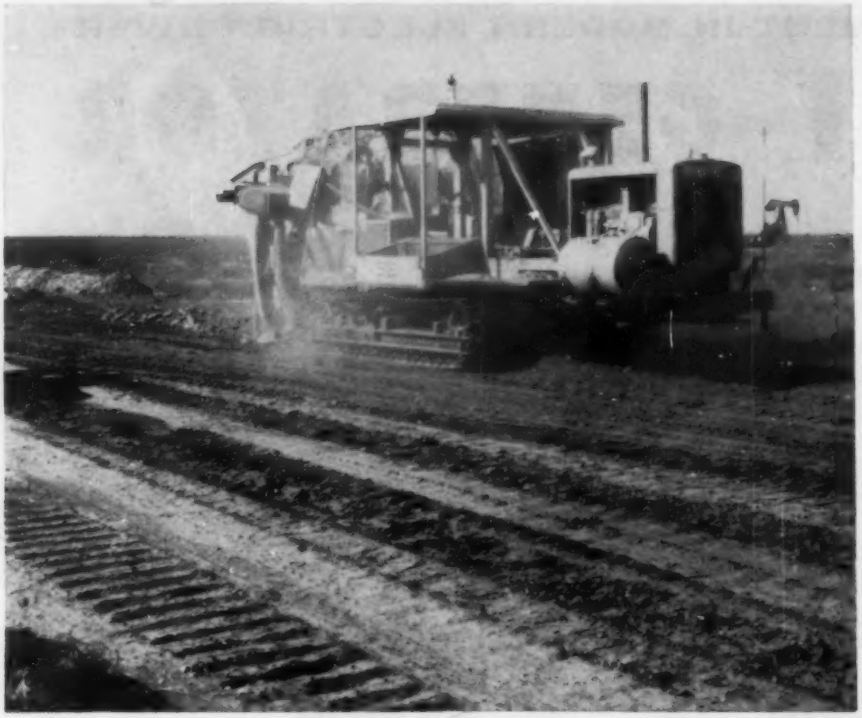

Cleveland "320" licks Ector County rock on recent Pioneer Gas line in Texas

As most pipeliners know, Ector County, Texas is in a class by itself when it comes to tough digging. Yet this Cleveland "320"—one of many owned by R. H. Fulton Construction Company of Lubbock, Texas—stayed right on schedule as it dug through 50 miles of Ector County's almost solid rock. This job for Pioneer Gas also points up the "320's" ability to dig smaller diameter lines economically, as well as the bigger-inch lines on which it is so widely employed.

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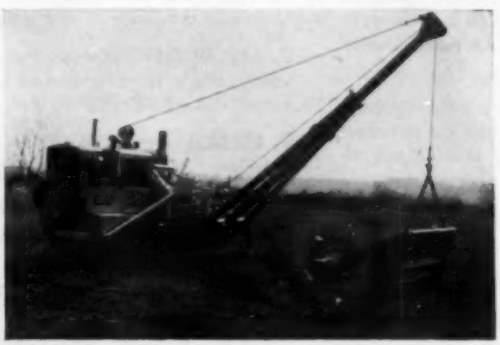

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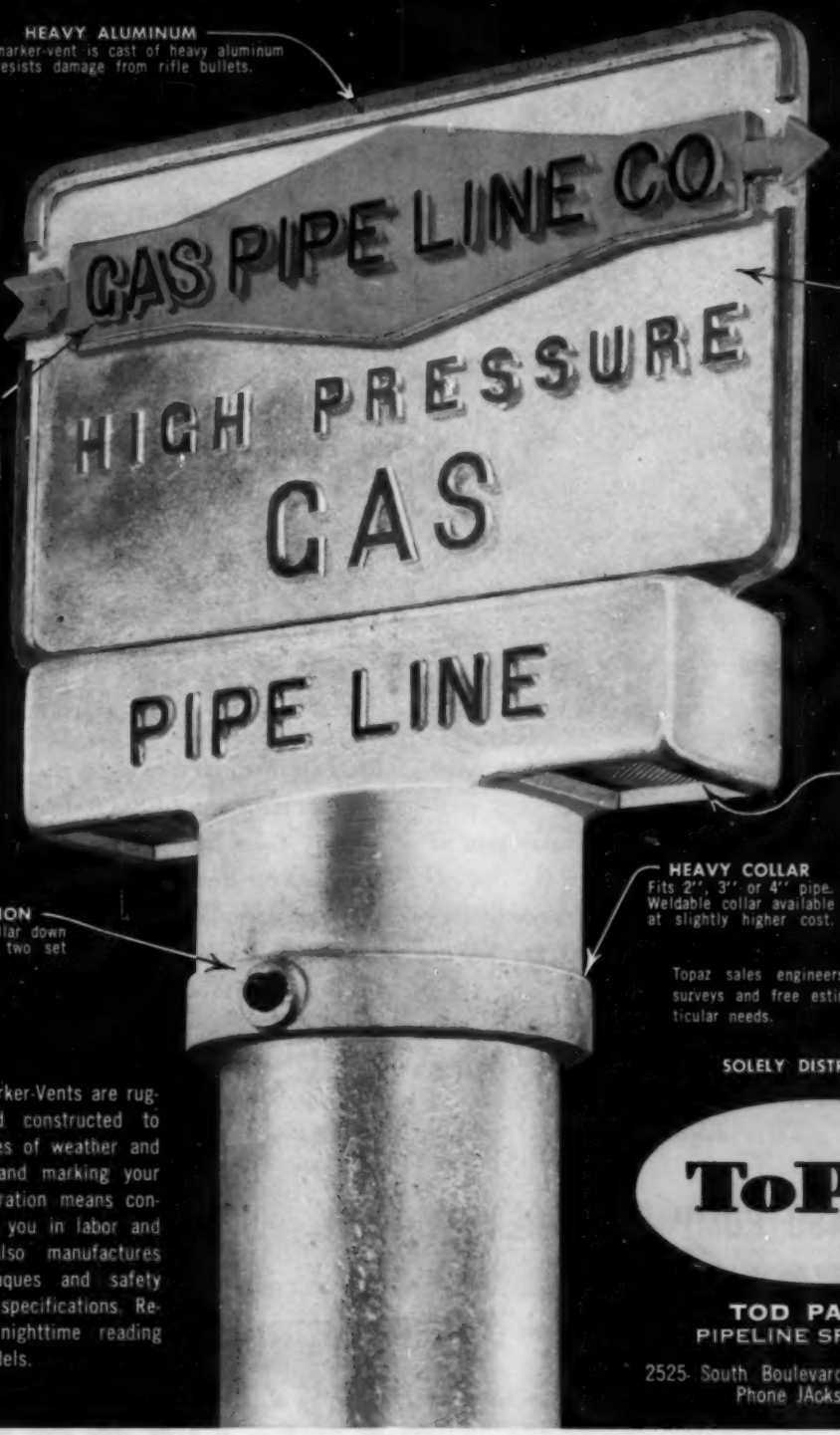

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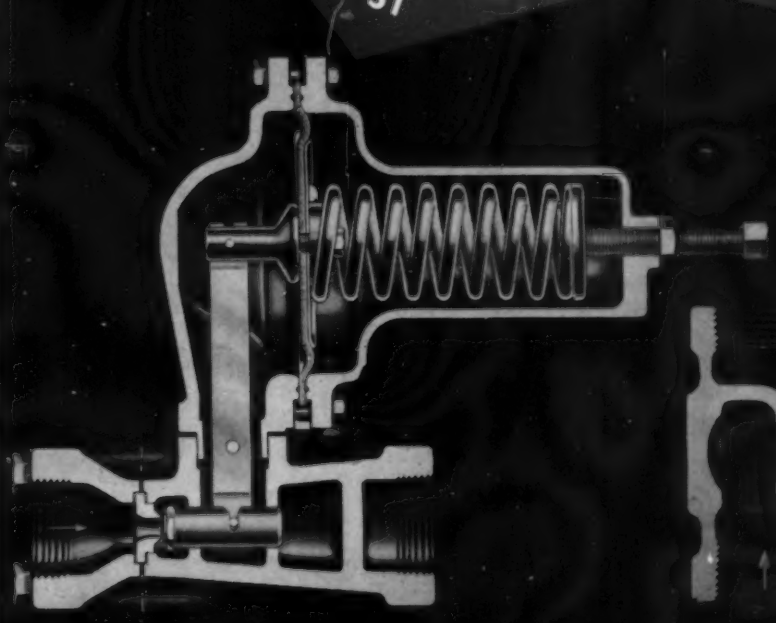

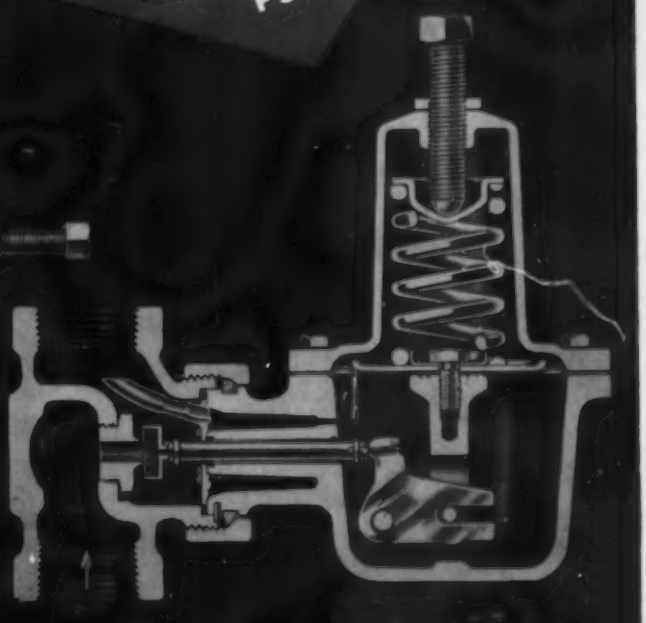

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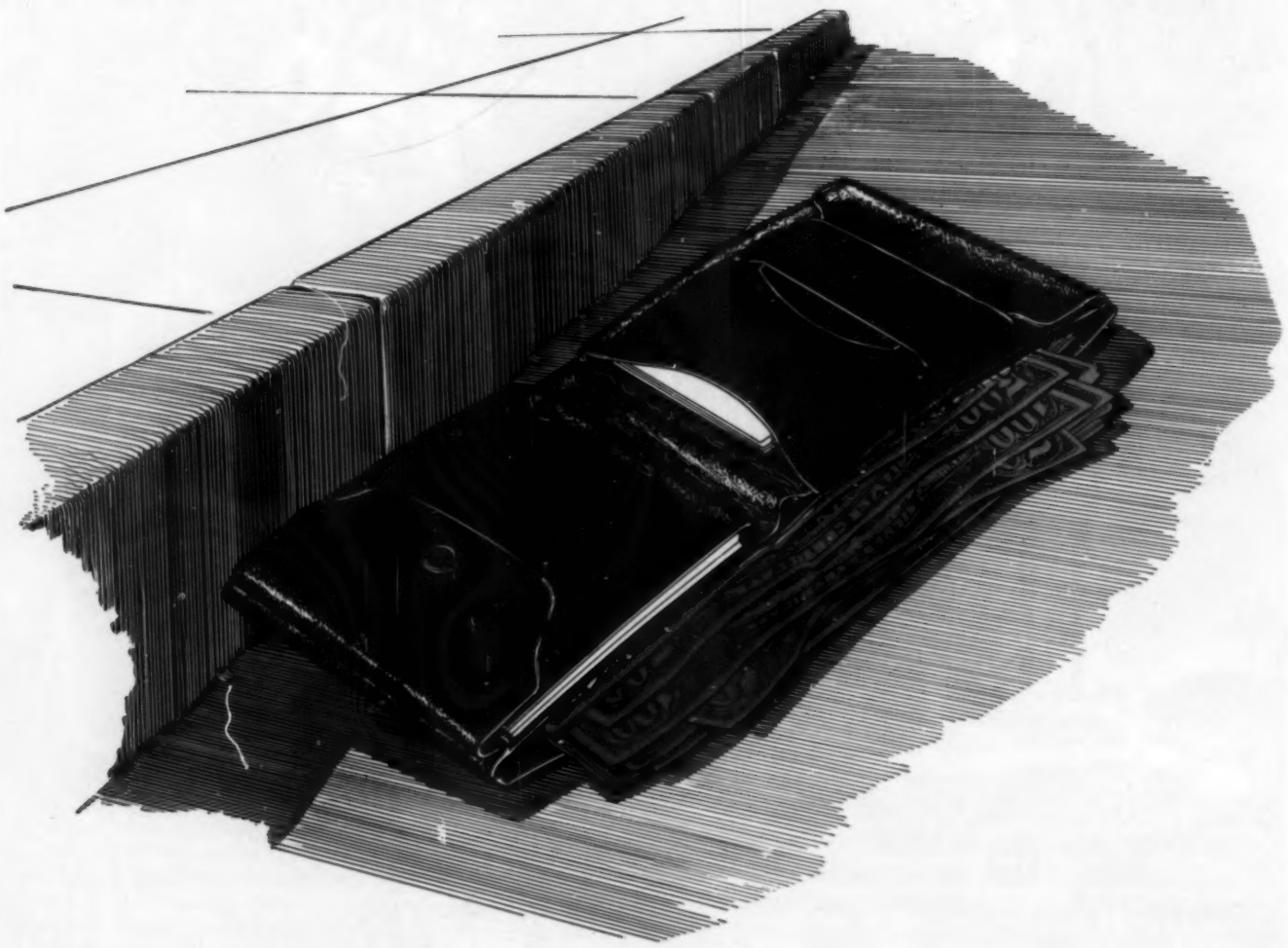

. . . that's what the

FREE SCAVENGING

of each Clark Turbocharged Compressor can save you annually in fuel alone

$5775 a year? Sounds like a lot of money to save on fuel for *every compressor you install* . . . but it's a fact!

Based on 20¢ fuel, a Clark Turbocharged Model TLA-10 Gas-Engine-Driven Compressor, rated at 3300 bhp, will save you $5775 per year compared to a high-compression, non-turbocharged, conventionally scavenged unit. Other Clark Turbocharged Compressors show comparable savings.

How are such large savings possible? With Clark Turbocharged Compressors, there is *no need* to drain power from the engine crankshaft for pumping scavenging air. Instead, the Clark Turbocharger uses "waste" exhaust gases to pump scavenging air free of charge. The resulting savings in fuel are enhanced even more by the high thermal efficiency of these new turbocharged units.

Free scavenging is only one of the many ways that Clark Turbocharged Compressors will save you money. Ask any Clark representative to prove it to you. Bulletin 134 provides valuable details. Write.

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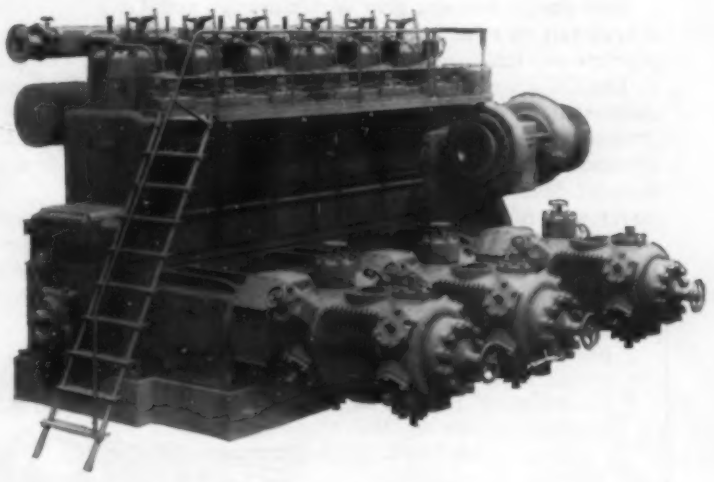
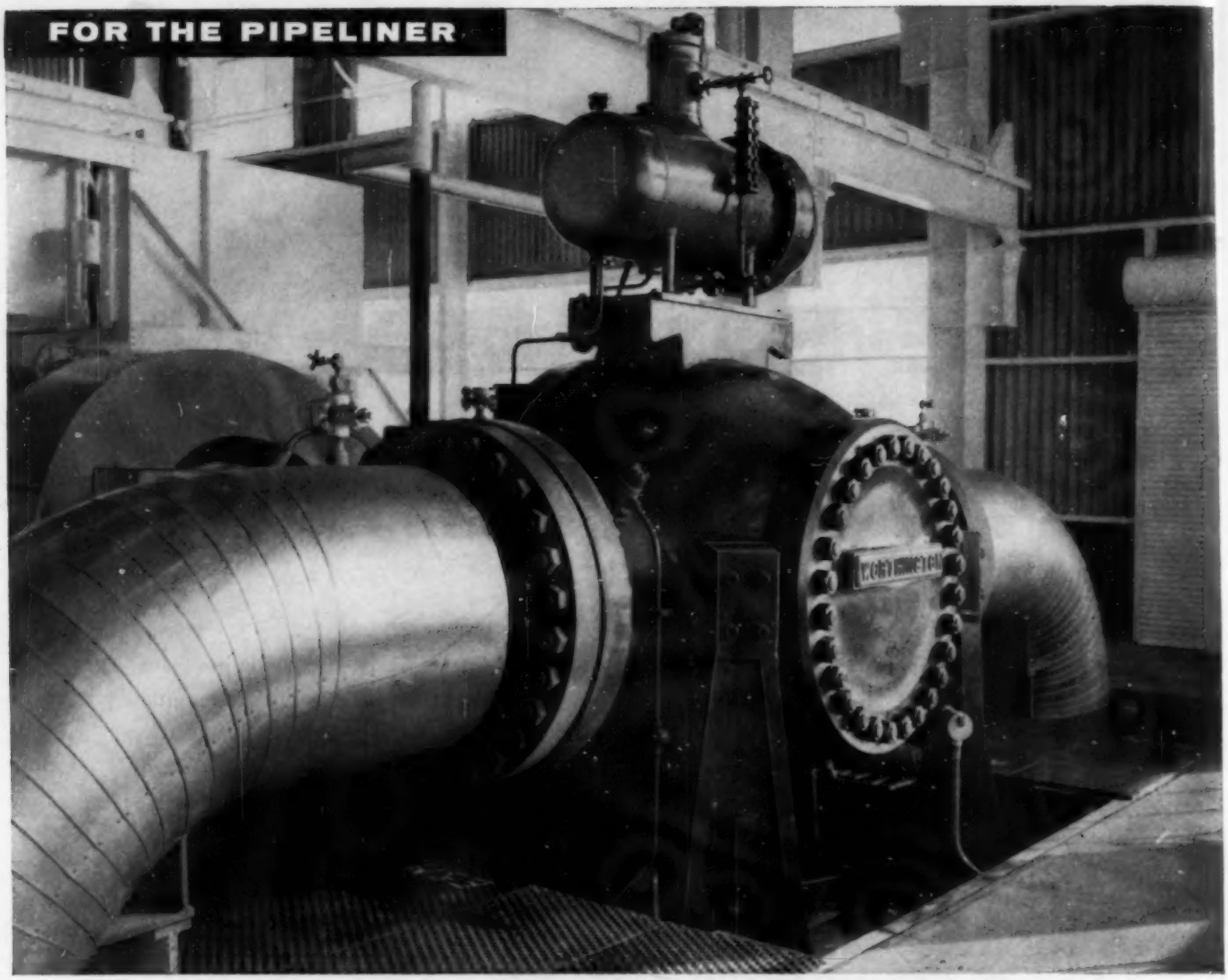


Clark sets the pace in compressor progress



WORTHINGTON GUP CENTRIFUGAL COMPRESSOR installed in Northern Natural Gas Company's Compressor Station at Macksville, Kansas.

New design concept combats shaft distortion, seal-oil leakage in new centrifugal compressor

New design features give Worthington's new GUP a headstart on other compressors for gas transmission pipeline service.

The GUP's main casing and support design minimize shaft centerline distortions arising from high pressure in the casing. Compressor casing is basically spherical with heavy pedestals providing centerline support. Shaft barrel support is carried on rear casing cover with no other external restraint.

Spherical casing design provides a cavity behind the impeller as a safeguard against accidental seal-oil leakage into gas stream. Seal design itself has had extensive service on this type of compressor.

Among other features is an integral lubrication and seal-oil system that's independent of the driver lubrication system. An emergency oil tank supplies the seal and lubricates the bearings in the event of pump failure. No internal bearing mishap can result in starving another bearing.

Result: a reliable single-stage, heavy-duty machine designed for the full range of gas transmission pipeline service. For details, request bulletin C1100B57, Worthington Corporation, Section EK.5.4, Harrison, New Jersey.

WORTHINGTON

Economical, Continuous Power — Diesel, Dual-Fuel and Spark-Ignition Engines, from 200 to 5000 bhp.

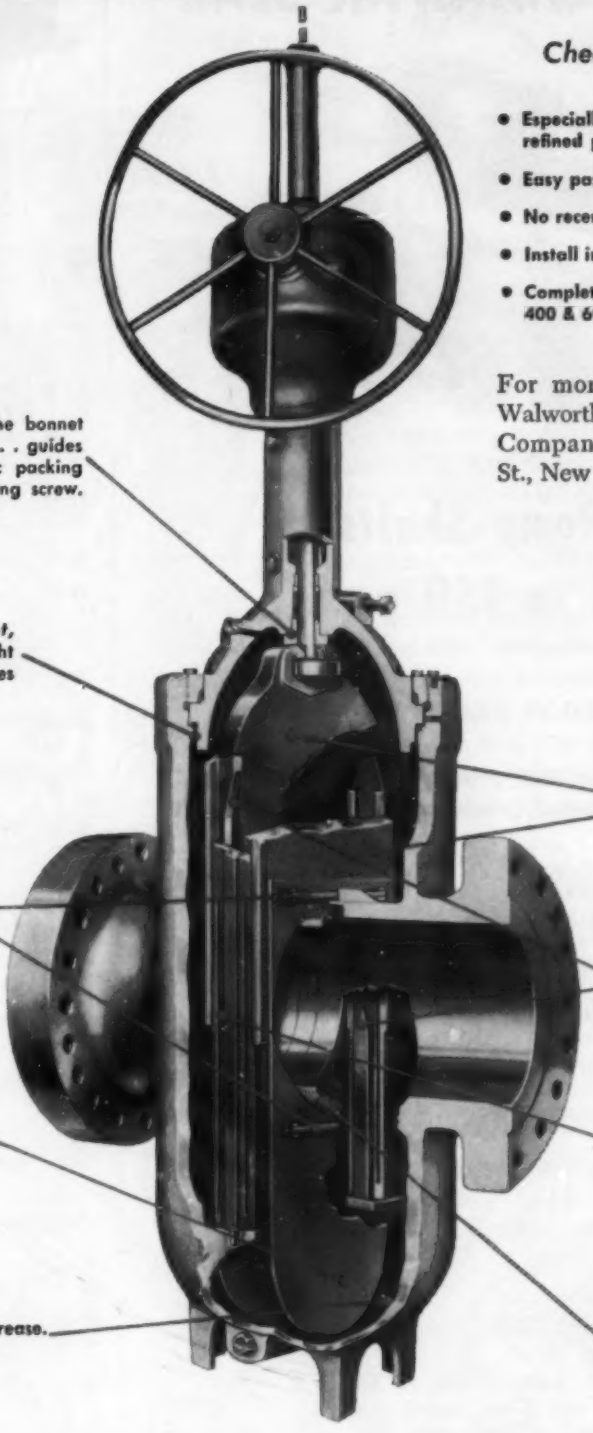
For Gas or Oil Pipelines . . .

HERE'S WHY OILMEN SPECIFY TYPE 49

Check these type **49** *features:*

- **Especially designed for pipelines handling crude oil, refined products, or gas.**
- **Easy passage for pigs or scrapers.**
- **No recesses to trap dirt.**
- **Install in any position, for flow in either direction.**
- **Complete line from sizes 2 to 30 inches in series 400 & 600.**

For more information, see your nearest Walworth Distributor or write to Walworth Company, General Offices, 60 East 42nd St., New York 17, N. Y. Ask for Circular 137.



Bonnet bushing **screws into the bonnet and is tack-welded in place . . . guides the stem, also retains plastic packing which is adjusted by a packing screw.**

Boltless, flangeless bonnet joint, **sealed with ring gasket, stays tight at all pressures. This design saves room, weight.**

Hard chromium-plated discs **resist corrosion, abrasion.**

Loading bars **press disc shield plates axially to wipe discs clean while valve is closing or opening.**

Leakproof closure, **provided by wedging surfaces on each guide and sides of the discs. Wedging surfaces press discs against seat rings.**

Disc shield plates **contact disc faces at all times to prevent dirt from entering the body cavity.**

Loading bars, **incorporated on the disc guides, press the discs axially against the seat rings to provide wiping action between the disc and seat ring faces.**

Valve needs no body-packing grease.

Backseated seat rings screw directly into body with perfect alignment. Stellite or bronze facing on ring.

Cutaway of a 16-inch Walworth Type 49 Cast Steel Pipeline Gate Valve

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valves . . . pipe fittings . . . pipe wrenches

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Walworth Company of Canada, Ltd., Toronto

For quick opening or closing Walworth manufactures lubricated plug valves for pipelines in sizes to 30-inches . . . pressures to 5000 psi and for vacuum service. Ask for literature.

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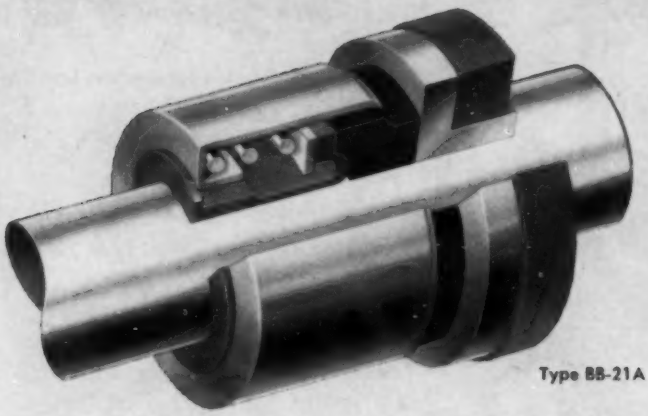
GARLOCK MECHANIPAK SEAL



Type BB-21A

for Rotating Pump Shafts at pressures up to 150 p.s.i.

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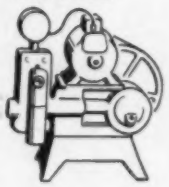
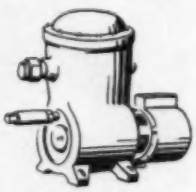


The Garlock BB-21A MECHANIPAK Seal, proven in service on thousands of water pumps, provides a low cost *leakless* seal.

IMPORTANT FEATURES



This MECHANIPAK Seal occupies a very small space—specifically designed for rotary pump shafts. It comes completely assembled, ready to install. Standard construction includes brass shell, brass washer and Buna-N bellows. Other materials available. Furnished for shafts from 3/8" to 3" diameters.

SAVE 3 WAYS

Customers tell us the MECHANIPAK Seal *pays for itself.* (1) Reduces maintenance costs (2) Absolutely no shaft wear (3) Cuts down time.

Get all the facts on this MECHANIPAK Seal. Write today for bulletin AD-150.

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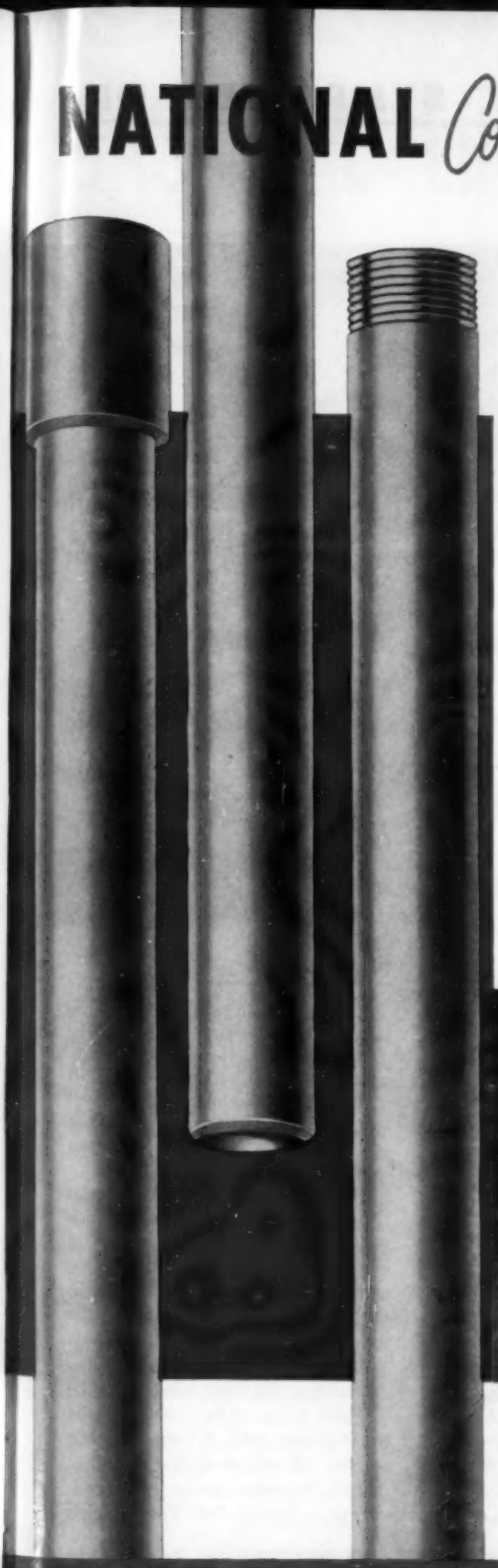
PACKINGS, GASKETS, OIL SEALS

MECHANICAL SEALS, RUBBER EXPANSION JOINTS

WHO'S MEETING WHERE

AUG.	
15–19	American Institute of Electrical Engineers, Pacific General Meeting, Butte, Mont.
29–31	Appalachian Gas Measurement Short Course, West Virginia University, Morgantown.
SEPT.	
11–13	Independent Natural Gas Association of America, Jasper Park Lodge, Jasper, Alberta.
12–14	American Institute of Electrical Engineers, Electrical Conference of the Petroleum Industry, Shamrock Hotel, Houston.
12–16	Instrument Society of America, Conference and Exhibit, Shrine Auditorium, Los Angeles.
12–16	American Institute of Electrical Engineers, Instrument Conference, Shrine Auditorium, Los Angeles.
12–16	Corrosion Short Course, Washington University and St. Louis Section, National Association of Corrosion Engineers, St. Louis.
13–24	International Instrument Congress and Exposition, Philadelphia.
14–15	Accident Prevention Conference, Sponsored by American Gas Association and Southern Gas Association, Marion Hotel, Little Rock, Ark.
14–16	National Petroleum Association, Annual Meeting, Traymore Hotel, Atlantic City, N.J.
22–23	Mid-Continent Oil & Gas Association, Louisiana-Arkansas Division, Membership Meeting, Roosevelt Hotel, New Orleans.
22–23	Products Pipe Line Control and Dispatching Group, Annual Meeting, Lennox Hotel, St. Louis.
25–29	American Society of Mechanical Engineers, Petroleum Mechanical Engineering Conference, Roosevelt Hotel, New Orleans.
25–30	International Gas Union Conference, Hotel New Yorker, New York.
28–29	American Institute of Electrical Engineers, Industrial Electronics Conference, Rackham Memorial Auditorium, Detroit.
OCT.	
2– 6	American Society for Testing Materials D-2, Petroleum Products and Lubricants, Statler Hotel, Washington.
3– 7	American Institute of Electrical Engineers, Morrison Hotel, Chicago.
9–15	American Petroleum Institute, Oil Progress Week.
12–14	National Association of Corrosion Engineers, Permian Basin Corrosion Tour, Lincoln Hotel, Odessa, Texas.
17–19	American Gas Association and Pacific Coast Gas Association, Ambassador, Biltmore and Statler Hotels, Los Angeles.
17–21	National Safety Congress, National Safety Council, Chicago.
18–21	National Association of Corrosion Engineers, South Central Regional Meeting, Shamrock Hotel, Houston.
21–23	First Cuban Congress on Petroleum, Sponsored by Universidad de Oriente (University of Oriente), Santiago de Cuba.
24–26	American Standards Association, Annual Meeting, Sheraton Park Hotel, Washington, D.C.
24–27	National Association of Railroad and Utilities Commissioners, Natural Gas Panel Discussion, Asheville, N.C.
27–29	Rocky Mountain Oil & Gas Association, Cosmopolitan Hotel, Denver.
31–Nov. 1	Independent Petroleum Association of America, Jefferson Hotel, St. Louis.
NOV.	
1– 3	National Association of Corrosion Engineers, Northeast Regional Meeting, Hotel Niagara Falls, Niagara Falls.
2– 4	Society of Automotive Engineers, Diesel Engine Meeting, Chase Hotel, St. Louis.

NATIONAL *Continuous Weld* LINE PIPE



for air, oil, gas and water line applications

The superiority of NATIONAL Continuous-Weld Line Pipe pays off for you in easier installation, better performance and longer service life. This superiority is based on three important factors. First . . . Over 60 years of experience in making tubular products famous for their high quality. Second, the most modern butt-weld pipe-making facilities in the world at Fairless Works, Fairless, Pa. And, third, the use of the unique stretch-reduction process, employed by National Tube since 1942.

Combined they give you a butt-welded line pipe that is always completely uniform throughout—in metallic structure, ductility, strength, corrosion resistance, surface finish and wall thickness. The working of the metal in the exclusive stretch-reduction process, itself, gives NATIONAL Continuous-Weld Line Pipe a better weld and a higher safety factor.

Get NATIONAL Continuous-Weld Line Pipe. It is available in sizes ½-inch to 4 inches. It's your best buy for air, oil, gas and water line installation.

For further information, write National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

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USS

NATIONAL *Continuous Weld* LINE PIPE

UNITED STATES STEEL

A SYMPOSIUM ON:

GAS . . . WATER . . . —Compared for HYDROSTATIC TESTING WITH NATURAL GAS

BACKGROUND

A wealth of experience and talent from the gas industry is concentrated each year at the Annual Short Course in Gas Technology sponsored by the Southern Gas Association at Texas College of Arts and Industries at Kingsville, Texas. During this year's tenth annual course, 33 industry leaders were on the program and more than 200 attended the course. Under the leadership of Dr. Frank Dotterweich, director of the Course, they discussed the latest advances in producing, processing, and transmitting natural gas. Recent adoption of the new ASME code for testing gas pipe lines put the spotlight on a panel discussion of pressure testing

L. C. POINDEXTER
United Gas Pipe Line Company

GENE PROPER
Transcontinental Gas Pipe Line Corp.

POINDEXTER SAYS:

THERE ARE STRONG ADVANTAGES—and disadvantages as well—in testing pipe lines with natural gas. *Consider the advantages first:*

1. It is available—and seldom requires additional equipment for the test.

2. Static head pressure variation is usually slight. This contrasts sharply with hydrostatic testing. For instance, at 1000 pounds per square inch the variation in static head of gas is about two pounds per square inch per 100 feet difference in elevation. For the same interval, a hydrostatic test gives about 43 psi variation. This factor can be critical in mountainous terrain.

3. Weight of the gas does not affect aerial suspensions since they are obviously designed for gas service. On the other hand, designs of suspended sections must be checked (and in some cases changed) before being subjected to the dead weight loading of water.

4. Unless someone is careless in the manner of introducing gas into the line, there is little likelihood that the pipe will be subjected to shock loading overstresses. Yet the possibility of accidentally subjecting the line to such stresses is a factor to be reckoned with during hydrostatic tests.

5. Leaks are easier to locate with gas. A strong odorant can be introduced to improve leak detection in virtually any kind of terrain. This is particularly true in our own case where we have so many lines in marshes and underwater in south Louisiana.

Continued on Page 25

PROPER SAYS:

ASIDE FROM using gas for testing lateral lines in the remote areas of Texas and Louisiana, Transcontinental Gas Pipe Line Corporation uses hydrostatic tests throughout its system. Our company engineers feel that the hydrostatic test is the safest method available.

The elimination of fire and explosion hazard is the number one advantage of the method. This means less danger to people and less property damage in the area of testing in the event of a line break during the test.

Admittedly, this method has disadvantages. All open spans must be designed to carry the weight of the water during tests. A considerable amount of special equipment is required; the proper source of water is sometimes hard to find. Too, the high

GAS PIPE LINE TESTING

SY ORLOFSKY
Gulf Interstate Gas Company

OLIVER W. CLARK
Moderator

AIR . . .

pipe line testing

BACKGROUND
Continued

practices being used in the industry. Heading the panel as moderator was Oliver W. Clark, vice-president, Southern Natural Gas Company. The other three members of the panel presented the case for each method —L. C. Poindexter, general pipe line superintendent for eastern division, United Gas Pipe Line Company; Gene Proper, senior engineer, Transcontinental Gas Pipe Line Corporation, and Sy Orlofsky, general superintendent, Gulf Interstate Gas Company. With the help of the Texas A. & I. staff and panel members, PIPE LINE INDUSTRY editors recorded the session for you. Here are the highlights.

TESTING

pressures of the test seem to drive water into the mill scale of the pipe. This requires repeated pigging with natural gas prior to placing the line in operation. (The answer to this problem may be internal coating, which our company is at present using on portions of new main line construction.)

Yet, with proper planning and equipment, hydrostatic testing can be highly satisfactory and economical.

The first consideration is the pumping equipment. This should include a low head, high-capacity pump capable of around 2000 gallons per minute, a fill pump with a capacity of 1300 gallons per minute and 500 pounds per square inch, and a high-pressure pump unit for final pressuri-

Continued on Page 26

HIGH PRESSURE AIR

ORLOFSKY SAYS:

DURING THE CONSTRUCTION of its new 1150-mile system, Gulf Interstate used all three methods of testing. The entire 841 miles of 30-inch main line was tested with air; the gathering system in south Louisiana was tested with gas; while a few short sections were hydrostatically tested. It was the first time that a main line this long had been completely cleaned and tested using high pressure air equipment.

Why did we choose air? There were several reasons. First, we wanted to use as safe a method as possible. Meeting a service schedule was an important factor, too. Gulf Interstate had contracted to deliver gas to its customer by November 1, 1954 (less than 15 months after construction got under way). We had as many as seven spreads working on the line at one time and with this many sections of disconnected pipe it was impractical to employ gas for testing.

Of course, there is a definite economical advantage with air. We did not have to purchase large quantities of gas for testing; high pressure air costs very little to produce after the initial equipment outlay. In addition, the use of air avoids the high cost of pigging to remove water following hydrostatic testing—often a tough problem. With the proper equipment available, high pressure air testing proved to be a most economical method.

Another advantage was that there was a minimum of waiting time and

Continued on Page 22

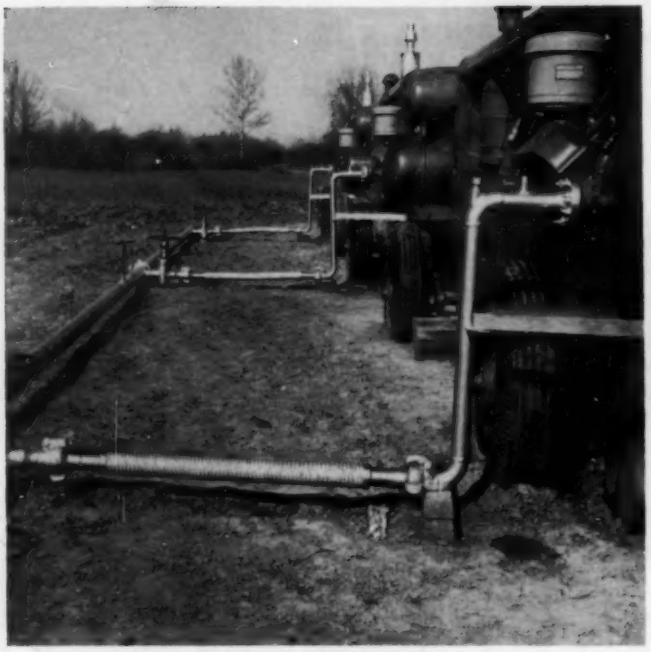


FIGURE 1—Compressors at Gulf Interstate's mobile air testing station are manifolded to pump either into the line or boost suction for higher pressure units. A section of stainless steel hose allows for vibration and expansion.

FIGURE 3—A pig launcher. Gulf Interstate proved that this piece of "artillery" would save time, air, and lots of work in coupling and uncoupling lines during cleaning. Each new section was cleaned with the built up high pressure air supply.

AIR *Continued from Page 21*

back-tracking after testing. As soon as construction crews were finished, testing crews could move in on a section and commence cleaning and pressure testing. When the crews were not busy at this task they moved ahead to set main line valves and drips. This enabled us to complete cleaning and testing operations just a few days after construction was finished.

An important feature of air testing as conducted on Gulf Interstate's line was that the test pressure from one end of a section to the other was virtually the same. This "flatness" was achieved by slow pressurization. The line was tested to 1050 pounds per square inch gage and to go from 1000 psig to 1050 psig took about 12 hours on a 12-15 mile section of line.

How to test with air. First, we had to decide on the type of equipment we were going to use. Time didn't permit us to have special machines manufactured, so we investigated the existing market of air compressors. Air testing requires highly portable, lightweight equipment with sufficient capacity to get the job done quickly. Mobility of equipment is important, particularly where rugged terrain must be crossed.

We found compressor equipment of the proper size already manufactured and available for purchase. Such units had been used by the government for reinjecting helium in wells in the Texas Panhandle area and for pressure testing of vessels by the U. S. Navy. Perhaps, if we could have designed our own compressors we might have chosen a more efficient size, but these existing units were within specified limits.

Each compressor weighs about 14,000 pounds. They are mounted on pneumatic tires and fitted with a tongue so they may either be towed or loaded on a lowboy for rapid movement along the line.

To complete the testing program as soon as possible after construction we used two crews, each equipped with nine diesel driven compressors utilizing 850 horsepower. Three low pressure units were capable of taking 600 cubic feet of air per minute from atmospheric up to 150 psi in two stages; for intermediate duty, three units with a 3¼-inch piston size and 5½-inch stroke could compress 600 cubic feet per minute from 150 pounds per square inch to 515 psi; while our three high pressure units equipped with $1^{15}/_{16}$-inch by 5½-inch liners finished pressurization up to a test pressure of 1050 psi. These units were capable of developing pressures up to 1250 psi, but the 1050 figure was considered adequate as maximum operating pressures will not exceed 935 psig at any point on the line.

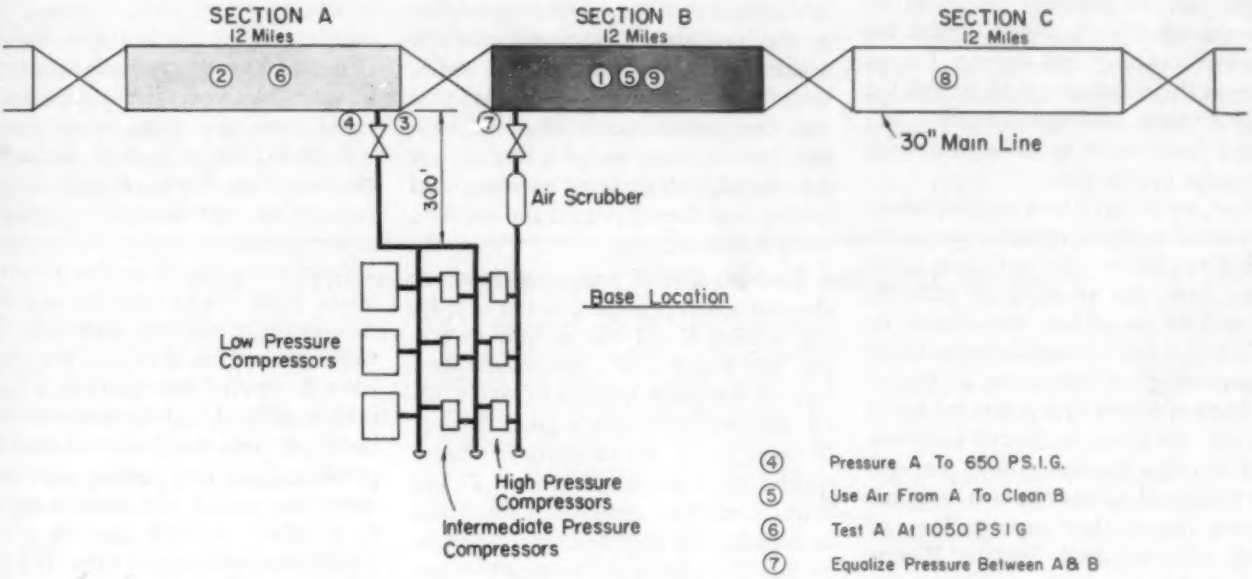
Equipment was manifolded as shown in Figure 1. All units could pump in parallel at the early stage of pressurization. When line pressures reached the limit of each compressor, air flow was controlled so that units could pump in series to take advantage of high suction and speed up the test. Expansion joints made from 3-foot lengths of 2-inch stainless steel hose connected each compressor unit to the 4-inch manifolds. These joints allowed for any slight misalignment, vibration of the machines, and expansion or contraction resulting from temperature changes. Incidentally, all manifold piping was hydrostatically tested to 1400 psi before pressure testing began.

To prevent any condensed water or compressor lubricating oil from entering the line under test, air scrubbers were installed downstream from the compressor manifold. One was used with the two-stage low pressure machines and the other was moved down the line with the high pressure units. Samples of high pressure air were taken from the line frequently and analyzed by a testing laboratory for hydrocarbon content. None of the samples were found to contain even traces of hydrocarbons.

Air conservation a must. Once we decided on air testing and obtained our equipment, the first operating problem was that of working out a procedure that would make the most efficient use of the high pressure air

How Gulf Interstate Saves Air By ...

Building Up A Supply ...

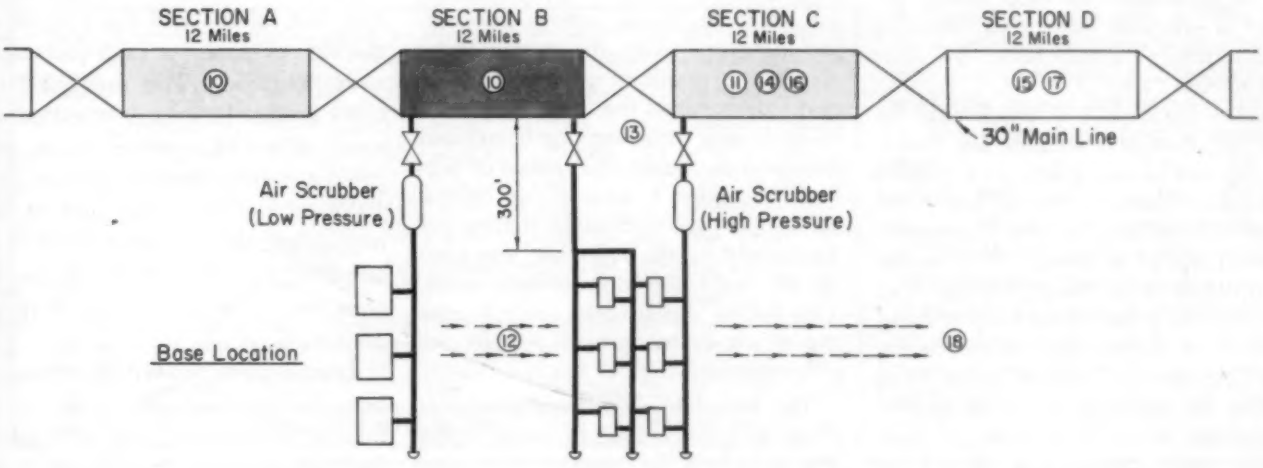


① Pressure B To 650 P.S.I.G.
② Use Air From B To Clean A
③ Equalize Pressure Between A & B
④ Pressure A To 650 P.S.I.G.
⑤ Use Air From A To Clean B
⑥ Test A At 1050 P.S.I.G
⑦ Equalize Pressure Between A & B
⑧ Air From A & B Used To Clean C
⑨ Test B At 1050 P.S.I.G
⑩ Air Supply Established

FIGURE 2A

FIGURE 2B

...And Then Using An Efficient Cleaning And Testing Routine . . .



⑩ High Pressure Air Supply In A & B Pressure In B At 1050 P.S.I.G., Section C Already Cleaned.
⑪ Pressure C To 200 P.S.I.G. From B. Walk And Deadweight Test C
⑫ Intermediate And High Pressure Units Shifted Downstream; Low Pressure Units Maintain Pressure At Base Location.
⑬ Equalize Pressure Across B & C
⑭ Take Suction On B And Pressure C To 500-800 P.S.I.G
⑮ Use Air From C To Clean D
⑯ Test C At 1050 P.S.I.G
⑰ Pressure D To 200 P.S.I.G., Walk And Deadweight D
⑱ Shift Compressors Downstream And Continue Cleaning And Testing

for cleaning and testing the line. To explain, we'll trace out the procedure on a typical portion of line as shown in Figure 2. Main line valves are spaced on an average of 12 to 15 miles apart. This is a good length for efficient cleaning and testing. Just as soon as the contractor had completed three sections we began cleaning and testing from valve to valve, following him right up the line.

First, we set up a base station, where all nine of the compressors were manifolded together so that they could pump from the atmospheric pressure up to 150 psi. Then they could be shifted to a series manifolding to boost pressure higher. Referring to Figure 2a, Section B was first pressured up to 650 psi. Air from Section B was then used to clean Section A and pressure was equalized across the two sections. Section A was then pressured up to about 650 psi and Section B was cleaned. As soon as B was blown out, Section A was closed off and pressured up to 1050 psi for the high pressure test. When the test of Section A was completed, the 1050 psi air was bled over to equalize pressure with B. Some of this air was then used to clean Section C and Section B was pressured up to the test pressure of 1050 psi. This initial build-up of a supply of high-pressure air took about ten days to establish. After that, cleaning and testing took only about 5½ days per section.

Once the supply of air is built up and the first two sections are tested, testing and cleaning follows a routine procedure. From the section just tested with 1050 psi air, the crew bleeds over enough air to a downstream section to pressure it to about 200 psi. The new section is then dead weighted and walked to inspect for obvious leaks. Walking the line paid off many times during the test program as we located a number of leaks that would have wasted large quantities of air had the line been immediately equalized with the back section. Meanwhile, the compressor units continued to pump into the tested section.

After inspection, the pressure in the two lines was equalized and the high pressure machines were disconnected from the line and transferred to the next gate valve setting. Equalized pressure in the two sections, (B and C in figure 2a) was about 525 psi. The $1^{15}/_{16}$ by 5½-inch compressors then took suction on Section B to pressure up C. When suction pressure dropped below 475 psi, the 3¼ by 5½-inch compressors were cut in series to boost capacity. During these operations, the low-pressure units continued pumping at the base station when necessary to maintain the pressure on the entire tested line at 150 psi. The final step was the pressurization of C to 1050 psi. When deadweight testing was completed, the cycle of cleaning and testing was then repeated for the next section downstream.

Each section of line under test was cleaned when pressures in the supplying section was between 500 to 800 psi. We found that a minimum pressure of 500 psi is needed to give a 12-15 mile section of line a good "blow." To save air in the cleaning of line, a special pig launcher shown in Figure 3 was used. This device was employed to release two pigs and one squeegee or one pig and three squeeges in sequence without uncoupling the line.

This launcher consists of a section of 31-inch diameter pipe, 18 feet, 8 inches long, fitted with a quick opening blanking cap upstream and welded to a 15-degree reverse bend. This bend was then swedged down to a 30-inch joint. The launcher was braced above a second 30-inch section of pipe. This section of 30-inch could be coupled into the main line to connect the existing air supply with the section to be cleaned. A manifold of 4-inch piping and valves joined the lower section of 30-inch with the launching barrel and was used to control the release of pigs and squeegees. A 30-inch cap having an 8-inch pipe and valve coming off the center of the launcher was connected with the downstream bend. This fitting was used to control passage of air at the proper velocity for efficiently blowing out the line.

The launcher saved large quantities of air and much time in cleaning the line. It could be readily uncoupled from the line and moved from section to section as cleaning progressed.

Safety is important. A pipe line under air test can blow up if certain conditions exist. One possibility is that of vapors from compressor lubricating oil mixing with air to form a combustible mixture. As a precaution against this, we kept compressor lubricating oil feed at a minimum, taking the chance on excessive machinery wear rather than risk a line explosion. Scrubbers were installed for extra safety and samples of high pressure air were analyzed for hydrocarbons and checked for dew point.

Testing crews were stationed about 300 feet off the right-of-way. Readings were taken and recorded every 30 minutes. Valves were controlled by cable from this point when pressure was bled from a section under high pressure test. Radio communications covered all control stations during the entire operation.

As a safeguard to the adjacent areas, road blocks were set out when the pressure reached 1000 psi. Railroads were advised so that they might have a repair crew alerted if necessary, and local and state law enforcement agencies were notified that high pressure pipe line testing was under way. This action was important, both as a safety measure and as a good public relations step. We decided upon the 1000 psi point because above this level pressure builds up at a rate of about 5 psi per hour on a 12-15 mile test section. This is the crucial time. If a line is going to fail, it will most likely happen then.

One failure proved safety advantage of air. During the air testing of the 841-mile main line we had only one failure, and this pointed out the big advantage of high pressure air over gas testing. This line failed in a creek bottom in a sparsely settled area south of our Hampshire, Tenn., compressor station. Pressure was at about 1045 psi nearing the end of final build-up. Rocks and dirt were scattered by the outrush of air and trees were defoliated, but there was no fire.

Investigation showed that construction damage was the cause of this failure. A backhoe had gouged the line and the pipe tore open cleanly at these marks. Compressors were shut down immediately; repairs were made; and as we had a large volume of high pressure air built up behind us our testing program wasn't stalled. Certainly, we didn't hope for this failure with air testing, but it emphasized the real safety of using high pressure air for testing gas pipe lines.

—**The End**

GAS *Continued from Page 20*

6. Using gas makes it possible to test station manifolds, separators and other equipment while testing the line.

7. After the line has been pressure tested, it is convenient to put on the leakage test, since gas is already in the line.

8. In testing with gas, the line is dry at the finish of the test. This is probably the most important advantage of all since it eliminates the expense of additional purging and permits the line to be put into immediate service if desired.

This is a matter of great importance when the line section has been taken out of service for repair and needed to maintain gas deliveries.

9. The hazard of freezing during cold weather is eliminated.

10. Last but not least, when testing a line that has been in service for some time, for some reason such as upgrading its operating pressure, service may be maintained during the test.

Disadvantages of gas testing

1. We have recently received a new code from the ASME and it is obvious even from a cursory examination of it, that there will be many cases where it will not be possible to use gas to test lines, no matter how desirable it may be. Secondly, there will be many cases where even though the code doesn't preclude it, you wouldn't put a gas test on the line. This is particularly true in the case of old lines. The most obvious disadvantage of gas testing is the possibility of explosion and fire, certainly.

2. If the section to be tested is remotely located from a gas source it would be impracticable to use gas.

3. There is also the matter of the cost of gas for repeated repressuring. For example, if you have a 20-mile section of 30-inch pipe line with 1000 pounds pressure under test and a leak makes it necessary to take it down you have about $7000 worth of gas in the line. Repressuring will get expensive in a hurry.

Factors affecting the choice of gas for testing. Here are a few points which should be given consideration before deciding on gas for testing:

1. Size of pipe.

2. Pipe specifications or mill test.

3. Type construction, whether it is welded or coupled.

4. Kind of terrain crossed.

5. Safe working pressure of valves and fittings.

6. Depth of cover.

7. Service to the public.

8. Facilities needed to test by other means.

9. For old lines, the condition of the

WHAT SECTION 8 OF ASA CODE SAYS ABOUT PRESSURE TESTING

POPULATION DENSITY along the right-of-way is the first consideration in rules spelled out for testing under the new code. Two population indices—one for a ten-mile section, the other for a one-mile length—govern the testing.

To determine the one-mile index, lay out a zone one-half mile wide, one-fourth mile on either side of the pipe line. Divide the zone into one-mile lengths and count the number of buildings intended for human occupancy in each length. These numbers are the one mile indices for the line.

To obtain the ten-mile index, add the one-mile density indices for a ten-mile section. (For the one mile sections with indices greater than 20, add it into the sum as 20.) Divide this sum by ten to get the ten-mile index of the pipe line.

These two indices are used together in classifying the line right-of-way sections.

Locations are divided into four classifications:

1. Class one locations include those waste lands, deserts, rugged mountains, grazing lands, farm land and combinations of these where

(a) The ten-mile density index for any section of the line is 12 or less, and

(b) The one-mile density index for any one-mile of line is 20 or less.

2. Fringe areas around cities and towns, and farm or industrial areas where the one-mile density index exceeds 20 or the ten-mile density index exceeds 12 are designated as Class 2 locations.

3. Areas subdivided for residential or commercial purposes where 10 percent or more of the lots abutting on the street or right-of-way are built upon at time of pipe line construction are called Class 3 unless a Class 4 designation applies.

4. Class 4 locations take in those areas where multi-story buildings are prevalent, and where traffic is heavy and where numerous other utilities are underground.

The code specifies that the design, construction and testing of pipe lines shall also take into consideration the reasonable possibility of future development of the area along the line. The table shows where you can use each method of testing.

Location Class	Permissible Test Fluid	PRESCRIBED TEST PRESSURE		Maximum Allowable Operating Pressure, the Lesser of
		Minimum	Maximum	
1	Water Air Gas	1.1 x m.o.p. 1.1 x m.o.p. 1.1 x m.o.p.	None 1.1 x d.p. 1.1 x d.p.	t.p. ÷ 1.1 or d.p.
2	Water Air	1.25 x m.o.p. 1.25 x m.o.p.	None 1.25 x d.p.	t.p. ÷ 1.25 or d.p.
3	Water	1.40 x m.o.p.	None	t.p. ÷ 1.40 or d.p.
4	Water	1.40 x m.o.p.	None	t.p. ÷ 1.40 or d.p.

m.o.p. = maximum operating pressure (not necessarily the maximum allowable operating pressure).
d.p. = design pressure.
t.p. = test pressure.
From American Standard Gas Transmission and Distribution Pipe Systems, Section 8 of American Standard Code for Pressure Piping, Published by the American Society of Mechanical Engineers.

GAS . . .

pipe and any replacements.

10. Possibility of water disposal if a hydrostatic test were used.

Leakage test. Since gas testing more often than not will be followed by a leakage test it might be well to briefly examine the techniques of the latter. There is hardly a subject in the entire industry which needs more looking into from the standpoint of testing techniques and interpretation of results. This is especially true where big-inch lines are concerned.

Generally the key to the success of the test depends on the selection and installation of instruments. Our company installs a recording thermometer at a point most likely to produce a representative temperature. (An average for the entire line). For pressure, we use recording gages and deadweight gages as well.

Our normal leakage limits are a maximum of 25,000 cubic feet per mile of 3-inch equivalent at 100 psi pressure per year. If the chart readings are not accurate, our pressure data won't be accurate enough to give results within these limits.

We take a barometric pressure reading at the beginning of the test. Gas is pressured up and left static long enough for the temperature to stabilize. There is some question as to how long this should be. Our normal minimum is about 12 hours but we prefer a 24-hour period. To improve accuracy of pressure data, we change charts and end the test early in the morning. This is done because of the more stable temperature conditions that exist during the night, especially in the summer when most construction work is done.

Every effort should be made to get an accurate leakage test. A test is obviously worthless if it shows up conditions that do not exist. It is a waste of time and money to tie up a pipe line with a contractor trying to find a leak that just is not there. On the other hand, if you have excessive leakage and your records show it as being within acceptable limits, the loss of gas through a hole in the line is just like money dribbling from your pocket.

Be sure that leakage test equipment is adequate, in good operating condition, and in the hands of people who know what they are doing to get the accurate results needed to make an intelligent operating decision.

It is unfortunate that the test of a 2-inch line is far more accurate than the test of a big-inch line. The same size leak that is serious on a 2-inch line is serious on a 30-inch line. Yet the leak on the latter is so small percentagewise that it is difficult to detect.

—The End

WATER *Continued from Paeg 21*

zation of the line. All of this equipment should be properly manifolded for flexibility and tied into the line through a check valve and an internally flanged nipple which may be left in the line.

Second in importance is the source of water. It should be analyzed for pH, alkalinity and carbon dioxide content and if necessary should be treated to prevent corrosion. Precautions are taken too, to eliminate as much dirt and mud as possible. At present, we are successfully using high capacity filtration units on the suction side of the hydrostatic fill pumps to solve this problem.

Terrain features are a source of problems with hydrostatic tests. In very hilly or mountainous country, the line must be tested in very short sections to prevent stressing the pipe beyond its minimum yield strength. It is necessary, too, in hilly country to carefully control the speed of squeegees. If they are allowed to move out ahead of the water on down hill slopes they will allow air to accumulate in pockets at the tops of the hills.

These air pockets require excessive pressuring to achieve a good test. In order to coordinate the allowable length of line for testing and to determine the pressure which must be attained at low points in the line to attain the minimum test pressure at high points, we make a profile of the section of the line to be tested preceding the test.

Routine field engineering calculations may be set up for quick simple solution to establish the integrity of a line under a hydrostatic test.

Here are some of the methods we use for obtaining and determining a good hydrostatic test:

Instruments needed.

- Ground temperature recording temperature gage
- Water inlet temperature recording gage
- Pipe temperature recording gage
- Method of measurement (by hydrostatic testing contractor) of water necessary to bring pressure in line filled with water up to test pressure.

Procedure for obtaining test data. Fill test section with water using batching pigs ahead of the water until section to be tested is full of water—that is, when pigs have reached either end of the line.

Continue to add water to raise pressure to test pressure. After hydrostatic test contractor has changed from his high capacity fill pump to his high pressure pump (400 to 600 pounds per square inch gage) and accurate measurement, preferably by use of contractor's measured tank of gallons of water necesary to bring to test pressure, should be taken.

Additional notations to be taken.

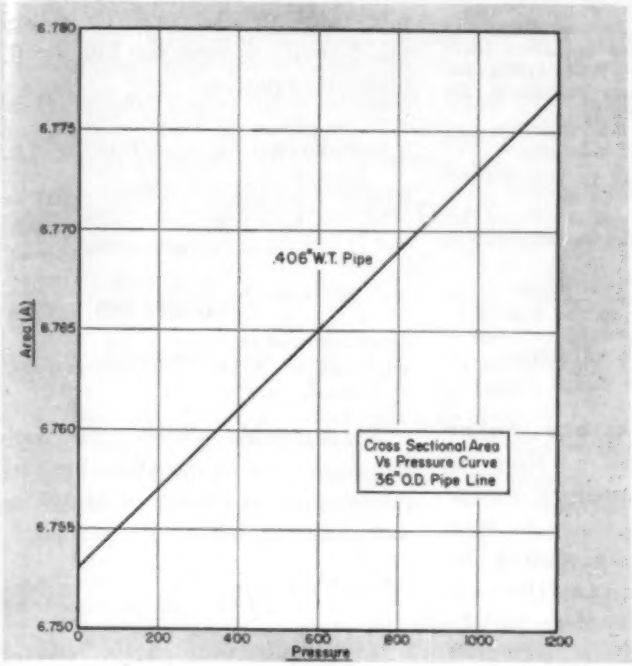
- Weather conditions
- Location of temperature recordings.

Calculations for proving hydrostatic test.

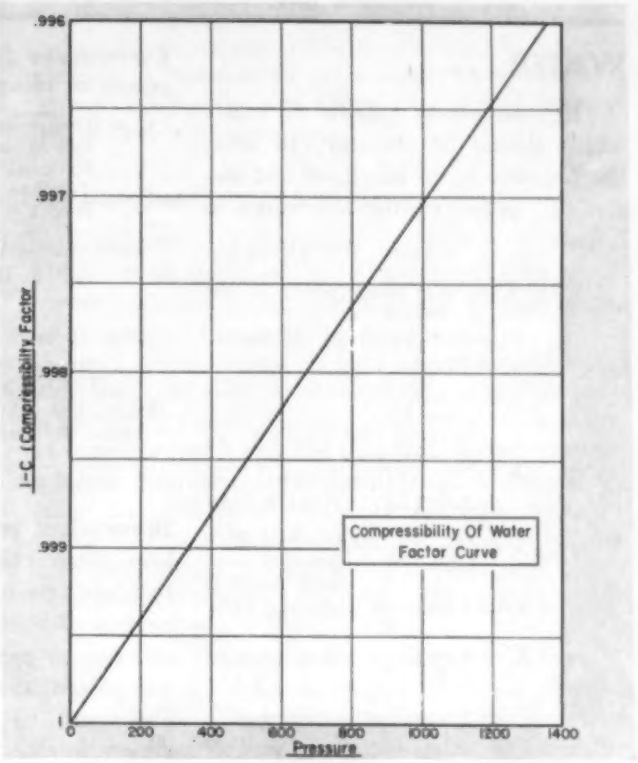
1. General data—This data is designed in particular for 36-inch and 30-inch outside diameter pipe lines but can be converted for any size line.

- Area of pipe at different pressures (see graphs 1 and 4)
- Compressibility of water = 4.5×10^{-5}/atm. (see graph 2)
- Change in water volume with temperature = 12.5×10^{-6}/degree

WATER . . .



GRAPH 1

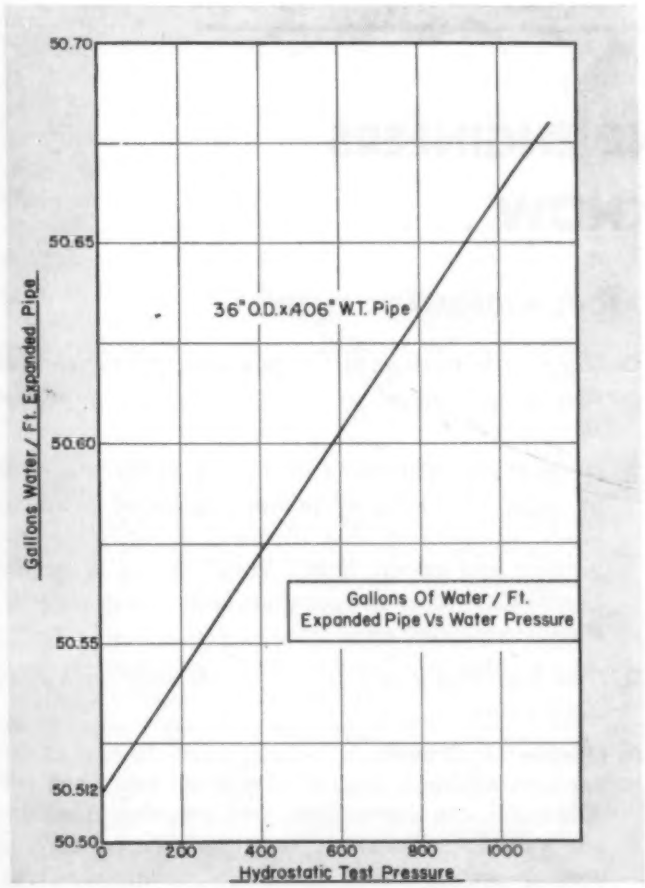


GRAPH 2

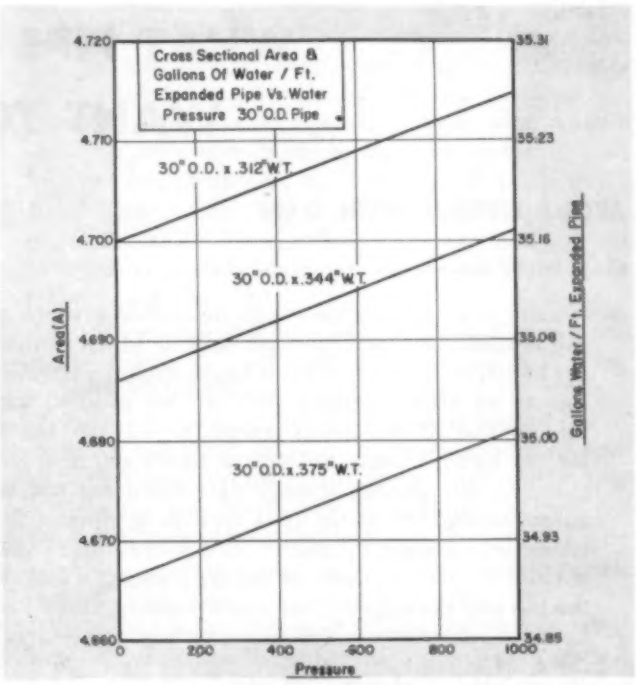
• Gallons of water per unit length of line (see graphs 3 and 4).

Determination of air in line. Since air will absorb approximately two percent by volume of water, air in the line will influence the amount of water necessary to attain the test pressures. The actual amount of water per pound of pressure attained can be obtained by the following formula:

$$Y = \frac{\text{(gallons of water added to raise pressure in line—measured in hydrostatic testing contractor's tank)}}{\text{(pressure range in line—start to end of measurement)}}$$



GRAPH 3



GRAPH 4

WATER . . .

The theoretical gallons of water which should be necessary to bring the pressure up in length of test section "L" in feet can be determined as follows:

Where X = Total water added to test section

C = Compressibility of water

V = Volume

$$X = \frac{V}{(1 - C)}$$

$$X = \frac{\text{Area of Test Pressure (from graph)} \times L}{1 - C \text{ (from graph)}}$$

$$\text{Then } X = \frac{\text{(A) (L)}}{1 - C} \quad \begin{matrix}\text{Read A from graphs 1 or 4} \\ \text{Read } 1 - c \text{ from graph 2}\end{matrix}$$

Then: if X_1 = Volume at beginning Pressure P_1

and X_2 = Volume at ending Pressure P_2

$$\frac{X_2 - X_1}{P_2 - P_1} = \text{Theoretical gallons/\#}$$

If more actual water is required to raise the water pressure than the theoretical, then air is indicated to be present in the line.

Corrections for volume loss because of temperature change.

V_t = Theoretical total volume of water in line at test pressurein gallons (may be read direct from graph for 1-foot-section and calculated for length of section "L")

Then change in Vol./degree = (V_t) (12.5×10^{-6}) gal/# (see general data)

$$\text{Then theoretical \#/degree temperature change} = \frac{(V_t)\ (12.5 \times 10^{-6})\ \text{gal/degree}}{\text{Theoretical gal/\# (see section 2 above)}}$$

$$\text{Actual \#/degree temperature change} = \frac{(V_t)\ (12.5 \times 10^{-6})\ \text{gal/degree}}{Y \text{ (actual gal/\# per section 2 above)}}$$

Theoretical permissible water loss. After calculations for temperature, etc., have accounted for a large portion of the water added to keep the line at test pressure during the test period, certain quantities will likely still be unaccounted for. In making a dead weight pressure test with gas, a permissible leakage which has an equivalent of water, is allowed by the U. S. Bureau of Mines formula as follows:

Permissible gas leakage = 5000 cubic feet/mile 3-inch equivalent pipe/year at 100 psig. To convert this formula to your size line use the following equation:

$$\text{Loss allowable for one mile of line at test pressure} = 5000 \times \frac{\text{Test Pressure} + 14.7}{100} \times \frac{\text{I.D. line}}{3.06}$$

$$= \text{Cu. ft./yr./mile of line}$$

$$\therefore \text{Cu. ft. loss/hr.} = \frac{\text{cu. ft./yr./mile}}{(365 \text{ days})\ (24 \text{ hrs})}$$

$$\text{Space occupied in line} = \frac{\text{cu. ft. loss/hr.} \times 15}{\text{(cu. ft./mile)}} \quad \frac{\text{Test pressure}}{} + 14.7$$

To determine whether the water loss equivalent to the allowable pressure loss in the Bureau of Mines formula, use the following equation:

(cu. ft. space/mile) (7.48 gal./cu. ft.) = gal./mile/hr. permissible loss

If your unaccounted for water is less than the permissible loss you should have established the integrity of the line.

—The End

WHAT PIPE LINE ENGINEERS WANT TO KNOW . . .

ABOUT TESTING WITH GAS?

Q. *What is the normal acceptable rate of leakage?*

A. (Poindexter) It may vary with individual companies. We normally accept 25 mcf per mile of 3-inch equivalent at 100 psi per year. This is based upon the standard Bureau of Mines formula. We are not satisfied with this method of evaluating acceptable leakage, but so far we haven't come up with a better solution. For example, our present leakage data often are not accurate enough to show up a leak in a 30-inch line which would show up readily in a 4-inch line. Losses amount to just as much in dollars through a hole in the big line even though we can't measure them. Perhaps we can start some thinking on the problem and come up with an answer.

Q. *In testing a large diameter line, if you find a leak, what do you do about excess gas in the line while welding?*

A. (Poindexter) We would shut the test down, bleed the line and make a permanent repair.

ABOUT HYDROSTATIC TESTING?

Q. *During a hydrostatic test do you allow for the absorption of air trapped in overbends when holding the static head?*

A. (Proper) No. This problem is normally taken care of by using high capacity pumps capable of attaining heads in excess of that necessary to overcome test pressure and gravity heads. Proper use of squeegees ahead of the water and adequate filling pump capacity eliminate trapped air.

Q. *How long does it take to pressure up lines for hydrostatic testing?*

A. (Proper) It depends, of course, upon the size of the line. On a 36-inch line, it takes about two hours per mile to fill with the equipment we are using. After the line is filled it takes about 5 or 10 minutes per mile to pressure up, depending upon the amount of air in the line.

Q. *In hydrostatic testing, do you follow the practice of "bumping" the line with a second surge of pressure?*

A. (Proper) No, we pressure the line up, allow it to stabilize for thirty minutes or so and then refill before we start the deadweight tests on the line. However, "bumping" might serve to stabilize the water pressure.

A. (Poindexter) This was a common practice a few years ago. The idea was to "bump" the line to cause mechanical movement of the line at sags and overbends. The thought was that stresses generated might show up leaks that wouldn't be detected with initial pressurization.

ABOUT AIR TESTING?

Q. *Is a nitrogen cushion used in purging air from lines being filled with gas?*

A. (Orlofsky) Yes, but our calculations showed that to maintain the inert gas cushion in a 12-mile section we would have to use a one mile slug of nitrogen. We did use an inert cushion for the first 5000 feet to start moving the air out and keep the air-gas interface out in the line well clear of the block valve and station.

Q. *Do a few runs with pigs and scrapers followed by a good blow clean the entire section of a pipe line efficiently?*

A. (Orlofsky) If you attempt to clean a line longer than 15 miles with these methods, you probably won't get it done. But, if you hold section lengths down to 12 or 15 miles and use a blow pressure of 500 psi with a five-minute blast you can get good results. It takes about five minutes to get a full sweep of a 12-mile section of line.

Q. *Following air cleaning, how does operating experience compare with design efficiencies?*

A. (Orlofsky) Various companies arrive at a comparison in different ways. We have just completed our efficiency tests and our actual efficiency is better than design.

Q. *In air testing, do you think a five minute hold of test pressure is long enough?*

A. (Orlofsky) Actually, we hold it for about 15 or 20 minutes. It is well to keep in mind, too, that it takes 10 hours to pressure up from 1000 psi to 1050 psi, so a high pressure is being held on the pipe for quite a while even though it is only left at the peak for a few minutes. In this way, you get a "flat" test on the line.

A. (Poindexter) It is generally accepted that if a line will stand a pressure at all, the matter of time isn't too important. In some cases with gas testing we hold it for 10 minutes, in others we hold pressure around the clock. In one case, we had some pipe with high chemistry in it. Failures occurred at times from 15 minutes after the test began to 21 hours later. This, of course, is an exceptional case. Normally, if a line is going to fail it will do so in a short time.

A. (Clark) Generally, we follow that same procedure, however, on new lines we sometimes hold pressure for 10 hours or as long as 24 hours. Over a longer period, temperatures will stabilize, and you will get a better test.

Q. *How does the pig launcher pay off in air testing?*

A. (Orlofsky) Using it, we were able to launch a number of pigs or squeegees in any order without having to repeatedly couple and uncouple the line. At times we reloaded as many as 30 times simply by opening the cap and loading the pigs. Quite a bit of high pressure air and time were saved.

ABOUT PRESSURE TESTING IN GENERAL?

Q. *Do you test to yield strength of the pipe?*

A. (Clark) Most companies do not test to yield. Certainly, not with gas where you are limited to 110 percent of design pressure or operating pressure.

A. (Proper) Some companies have tested to yield as an experiment. In our tests we have limited our pressures to those specified in the new ASA code. With hydrostatic testing you have to be sure that the accumulative pressure plus the gravity head does not exceed the minimum yield of the pipe. In a recent panel discussion on the code the answer was brought out that it wouldn't be of any particular advantage to test to yield as the design of lines would still be governed by pressure limits of the code.

Q. *How are lines purged ahead of gas fill?*

A. (Poindexter) If the line is equipped with pig traps, we place a pig in the launching trap and force it through the line into the receiving trap with gas pressure, thereby replacing the air in the line with gas. Then we make a nominal blow at the receiving trap to free the line of any dust or scale which may be behind the pig. But, if we have an open ended line we go to extremes in purging. We displace with seven times the volume of the line filling with gas directly behind the air.

A. (Orlofsky) When we finished testing our main line we had a continuous line filled with air. In cleaning the line first we determined what the critical velocity would be through the blow-off. We then calculated the pressure required in the back section to give us this velocity assuming a sweep volume of four displacements. A continuous gas analyzer was fitted at the blow-off. Readings of 100 percent gas were usually obtained after two displacements. As we went on to four displacements, readings continued at 100 percent. Incidentally, when the gas interface passes through the blow-off you will hear a distinct change in the sound of the discharge. Using this practice we cleared 40 to 90 miles per day.

Q. *A lot of equipment is required for air and hydrostatic testing which may rule out their use on small lines. Are any contract services available?*

A. (Panel) Yes, there are several service organizations set up to do this work. In addition, many regular oil field service companies have equipment with which they can do the job. Some pipe line companies lease out their equipment for testing jobs, too.

Q. *Is the purpose of testing to determine safe operating pressure or leakage?*

A. (Clark) Actually, it is both. Tests are to determine that the pipe has sufficient physical strength to operate safely, and that it has the integrity to hold gas so that your leakage rate is below acceptable limits.

A. (Poindexter) For the purpose of the code, the leakage test is specified for safety, but it has an economic value to your company, too. —**The End**

HOW TO CALCULATE GAS LINE FLOW EFFICIENCIES

By MERLE S. GREAVES
Texas Eastern Transmission Corporation

Here is Texas Eastern's method which is based on the Panhandle Formula.

HERE IS HOW the Operating department of Texas Eastern Transmission Corporation calculates flow efficiencies. The Panhandle Formula (developed by Panhandle Eastern Pipe Line Company) is used as the basic formula. The Panhandle Formula can be written as follows:

$$Q = 883\,E\,(P_1^2 - P_2^2)^{.5394}\left(\frac{1}{L}\right)^{.5394} d^{2.6182}\,\frac{0.60}{G}^{.4606}$$

$$\left(\frac{519.6}{459.6 + T}\right)^{.5394}\left(\frac{14.735}{P_b}\right)^{1.0788}$$

Nomenclature:

- Q = Volume of gas per day (cubic feet)
- E = Efficiency of pipe line (percent)
- P_1 = Inlet Pressure (pounds per square inch absolute)
- P_2 = Outlet Pressure (psia)
- L = Length of pipe (miles)
- d = Inside diameter of pipe (inches)
- G = Specific gravity of gas (air = 1.0)
- T = Actual mean flowing temperature (°F.)
- Pb = Pressure basis for defining a cubic foot of gas (psia)

In the basic Panhandle Formula, as written before, there are elements or parts that may be considered as constants for any given section of a pipe line. A section of pipe line normally is considered as being the main line beginning at the discharge side of one compressor station and continuing to the suction side of the next compressor station.

It can be seen that for any given section of pipe line the length of pipe (L), and the inside diameter of the pipe (d) will remain constant until major piping changes are made. Also, since most natural gas pipe line companies use a pressure base which is standard for their calculations, ours being 15.025 psia, the pressure base correction may be considered as a constant.

By taking the numerical constant of 883, which is shown in the basic Panhandle Formula, and grouping this with the constants cited above, we have a group of constants which for identification purposes is called "Section Flow Constants" (SFC) which may be shown as the

following equation:

$$SFC = 883\left(\frac{1}{L}\right)^{.5394} d^{2.6182}\left(\frac{14.735}{Pb}\right)^{1.0788}$$

When a pressure base of 15.025 psia is used, the equation then becomes:

$$SFC = 864.62\left(\frac{1}{L}\right)^{.5394} d^{2.6182}$$

As working time permits or necessity of use dictates, values for Section Flow Constants for each pipe line section of the system may be calculated, and once calculated a tabulation can be made so that the value may be used time and time again with new calculations being required only when an actual physical change is made within the pipe line section.

The desired accuracy of the results will dictate the care and accuracy by which the Section Flow Constants are calculated. In the opinion of the author that extreme accuracy should be strived for, and to arrive at this accuracy carefully calculated equivalent lengths and diameters should be used for the values of (L) and (d) in the Section Flow Constants. Appendixes I and II show sample forms which we used to make these calculations.

The basic Panhandle Formula may now be written as:

$$Q = SFC \times E \ (P^2_1 - P^2_2)^{.5394}\left(\frac{0.60}{G}\right)^{.4606}\left(\frac{519.6}{459.6+T}\right)^{.5394}$$

For further breakdown of the basic Panhandle Formula, take $\left(\frac{0.60}{G}\right)^{.4606}\left(\frac{519.6}{459.6+T}\right)^{.5394}$ from the formula and apply the name of Gravity and Temperature Correction (GTC). Since both the gravity and temperature of the gas is continually changing, it is suggested that tables for the values of $\left(\frac{0.60}{G}\right)^{.4606}\left(\frac{519.6}{459.6+T}\right)^{.5394}$ be calculated and retained for repeated use. Examples of such tables are shown as Appendix III.

By this last breakdown the basic Panhandle Formula becomes:

$$Q = SFC \times E \ (P^2_1 - P^2_2)^{.5394} \times GTC.$$

By using this flow formula in obtaining pipe line efficiencies, we are calculating the theoretical volume in which E is 100 percent, and therefore, the E in the above formula may be dropped, and efficiency defined as actual measured volume divided by the theoretical volume.

Thus the basic Panhandle Formula is reduced to:

$$Q = SFC \ (P^2_1 - P^2_2)^{.5394} \ GTC$$

The Section Flow Constant (SFC) can be precalculated and the Gravity-Temperature Correction (GTC) may be found in tables leaving only the $(P^2_1 - P^2_2)^{.5394}$ value to be determined in order to obtain the theoretical volume for use in line efficiency calculations.

By using the basic Panhandle Formula broken into groups as briefly described above, and having a tendency to omit the use of curves, graphs and other such devices which have been produced to facilitate speed of calculation at the expense of accuracy, it is felt that we have a method which is both mathematically accurate and has some of the elements of speed also incorporated. However, mathematical accuracy is not the only type of accuracy involved in efficiency calculations. There is also accuracy of information both in original source of information and the choice and use of information, and it is this accuracy that is more difficult of the two to achieve.

Before entering into a discussion on the source of information it should be understood that two types of efficiency calculations are made which are basically the same, but which do have some differences in regard to the source of information and purpose for making the calculations. So that each may be distinguished, one will be called "regular efficiencies" and defined as being efficiencies calculated monthly from information obtained through normal operating procedures for the purpose of observing trends in pipe line performance. The second type will be called "special efficiencies" and define this as being efficiencies calculated when the need arises, these calculations being made from information obtained by personnel in the field at the original source of information.

Since efficiency can be defined as actual measured volume divided by the theoretical volume $E = \frac{Q\ Actual}{Q\ Theoretical}$ it is essential that measured volume be accurate. To obtain an accurate measured volume it is first necessary to stabilize the flow in a pipe line as much as operating conditions will permit. The ultimate in flow stabilization would be to have no change in volume, pressures, temperatures, and gravity conditions for a period equal to the time required for the gas to travel from the farthest upstream point to the farthest downstream point of the sections involved in the efficiency calculations. It is not always possible to obtain this condition when several sections of a system are involved, but it is possible to stabilize a line for a period of 4 to 6 hours, and it is felt that reasonably reliable information can be obtained if simultaneous spot reading of all factors involved are obtained at the end of a 4 to 6-hour period of stabilized conditions. It is believed that simultaneous spot readings are better than averages and will have somewhat of a tendency to overcome the inability to maintain a perfectly stabilized line.

For the purpose of special efficiency calculations input and output volumes are obtained, usually from the Measurement department, at each location, taking direct simultaneous spot readings of pressure, inches differential, temperature and gravity. The input and output volumes are then calculated in the same office as the efficiency calculations.

Since there are often input or output points within this so defined line section, it is necessary to use the actual volumes obtained for each of the various input or output points and arrive at a calculated equivalent section throughput volume. This calculation may be made without impairing the over-all accuracy of the efficiency calculation if the input or output volumes are relatively small percentages of the total section volume.

By use of the calculated equivalent section throughput volume the overwhelming burden of calculating line efficiencies between each input or output point is eliminated. This equivalent section throughput volume calculation can be made on an individual volume mileage traveled

basis. An example of such a calculation is included as Appendix IV.

For inlet and outlet pressure readings (P_1) and (P_2) personnel at each compressor station take simultaneous spot deadweight readings. We feel that at least three such readings at each location, 30 minutes apart, should be taken to help eliminate the possibility of error; this also aids in determining line stability.

The suction and discharge pressure readings are taken some distance from station piping, because it is felt that this gives more accurate information as to main line conditions. Once points have been selected for pressure readings, the same points should be used in all subsequent efficiency calculations involving that specific section. It has been found that for actual calculations made simultaneously and by changing only the point of pressure readings, efficiencies would change as high as 2 percent. Thus, in any comparison of past, present or future line efficiencies for that specific section the change in efficiency observed could be simply due to the change in location of pressure readings.

For the specific gravity (G) to be used in the Panhandle Formula readings are taken at sufficient points on the system or sections under consideration to assure that a specific gravity has been obtained that is representative of gas flowing in the section at the time the other relative information is being obtained.

The actual mean flowing temperature (T) to be used in the Panhandle Formula will perhaps be the most controversial point among the necessary information to obtain and calculate. To obtain the temperatures at each end of a given section we once again depend upon compressor station personnel for information. Simultaneous readings of the gas temperatures are taken on each side of the compressor station and reported to the person making the efficiency calculations. Once this information is received, mean temperature calculations are made using heat transfer coefficients for the specific section as developed by the Engineering department from actual field data. It is known that the heat transfer coefficient for a given section will change from time to time. However, to obtain information necessary to calculate heat transfer coefficients each time line efficiencies are calculated the use of personnel is for all practicability prohibitive. The fact also should be remembered that it takes a 10 degree change in temperature to effect a 1 percent change in line efficiencies. With this fact in mind and also the impracticability of developing new heat transfer coefficients for each efficiency calculation, we have chosen to use the coefficients as developed by the Engineering department as constants.

Having now received from the field pressures, temperatures, specific gravities, and information necessary to calculate actual volumes, the field information can be combined with information on hand in the office pertaining to the individual Section Flow Constants, and by applying all information to the reduced basic Panhandle Formula arrive at the theoretical volume necessary to calculate line flow efficiencies.

For the regular efficiencies, pressures and temperatures are obtained from the dispatching records as re-

APPENDIX I

Determining Equivalent Length for Line With Different Inside Diameters — Location Hempstead Station to Huntsville Station
24" Wilcox Line — 7-1-54 Date

From Plus	To Plus	Pipe O.D.	Pipe Wall	Lin. Feet	Lin. Miles
3217+88	3222+11	24"	.544"	423	0.080
3222+11	6485+95	24"	.3125"	326, 384	61.815
6485+95	6489+14	24"	.544"	319	0.060
			Totals	327,126	61.955

Equivalent Length (Le) to be calculated in terms of 24" x .3125 pipe.

Actual Length		Equivalent Length
326,384 Ft. of 24" x .3125" Pipe x Factor 1.0000 =		326,384 Ft.
742 Ft. of 24" x .544" Pipe x Factor 1.1019 =		818 Ft.
____ Ft. of ____" Pipe x Factor ____ =		____ Ft.
____ Ft. of ____" Pipe x Factor ____ =		____ Ft.
____ Ft. of ____" Pipe x Factor ____ =		____ Ft.
327,126 Total Feet	Total Feet	327,202
61.955 Total Miles	Total Miles	61.970

APPENDIX II

Calculation for Section Flow Constant
Location Hempstead Station to Huntsville Station
24" Wilcox Line — Date 7-1-54

Note: $\text{Factor} = \left(\frac{d_1}{d_2}\right)^{4.8539}$

Where d_1 = I.D. of pipe in which (Le) is desired
Where d_2 = I.D. of pipe to be converted to (Le) of d_1 I.D. pipe.

$$SFC = 883 \left(\frac{1}{L}\right)^{.5394} \times d^{2.6182} \times \left(\frac{14.735}{Pb}\right)^{1.0788}$$

$$SFC = 883 \left(\frac{1}{L}\right)^{.5394} \times d^{2.6182} \times \left(\frac{14.735}{15.025}\right)^{1.0788}$$

$$SFC = 883 \left(\frac{1}{L}\right)^{.5394} \times d^{2.6182} \times (.97918)$$

$$SFC = 864.62 \left(\frac{1}{L}\right)^{.5394} \times d^{2.6182}$$

$$SFC = 864.62 \times \left(\frac{1}{61.970}\right)^{.5394} \times (24" \times .3125")^{2.6182}$$

$$SFC = 864.62 \times .1080 \times 3834.12$$

$$SFC = 358{,}026$$

Where: L = Length of Single Line or Equivalent Line in Miles.
d = Inside Diameter of Line in Inches.

ported from compressor stations hourly. To obtain reasonable information, the dispatching records are studied and readings are chosen when pressure conditions indicate a stable line. Volumes and gravities are obtained from meter charts as received by the Measurement department, with the volumes chosen at a time to coincide with the pressure and temperature readings chosen.

The omission of elevation corrections and compressibility corrections is not an oversight. Since the company's prime objective in line efficiency calculations is to observe the trend in regard to past, present and future line performance, the use of these two corrections are omitted as the earlier calculations of line efficiency for the system were based on the Panhandle Formula without consideration given to elevation and compressibility corrections. If present line efficiencies are to be compared with past line efficiencies, it is felt that the same basis of calculations must be used.

A comparison of line efficiencies between companies is not indicative of pipe line performance characteristics. Although each company may use the same basic Panhandle Formula, each may have a slightly different use and treatment of temperatures, gravities, equivalent section throughput volume, location of pressure readings, use of elevation correction and compressibility correction, all or any one of which could lead to differences in line efficiencies. It is felt that line efficiencies are of real value only when a comparison is made on a given section based on the same method of calculation and considered as a trend in line performance.

ACKNOWLEDGMENT

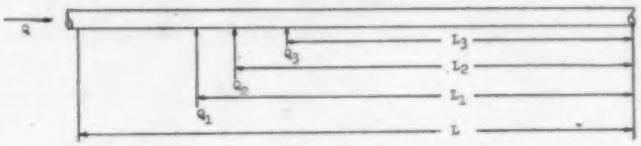
Presented at the Tenth Annual Short Course in Gas Technology, Texas College of Arts and Industries, Kingsville, Texas, June 3, 1955.

APPENDIX IV

Calculation of Equivalent Section Throughput Volume

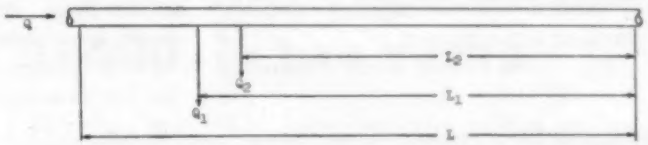
This method of finding equivalent section throughput volume is based on an individual volume mileage traveled and may be used if the intermediate volumes are relatively small percentages of the total section volume. As an example we shall use the following illustration.

For Input Points



$$Qe = Q + \frac{Q_1 L_1}{L} + \frac{Q_2 L_2}{L} + \frac{Q_3 L_3}{L} \quad . \quad . \quad . \quad . \quad . \quad .$$

For Output Points



$$Qe = Q - \frac{Q_1 L_1}{L} - \frac{Q_2 L_2}{L} \quad . \quad . \quad . \quad . \quad . \quad .$$

APPENDIX III

$$\left(\frac{0.60}{G}\right)^{.4608} \times \left(\frac{519.6}{459.6 + T}\right)^{.5394}$$

Flowing Temp. T	SPECIFIC GRAVITY										Flowing Temp. T
	.600	.601	.602	.603	.604	.605	.606	.607	.608	.609	
40	1.0214	1.0206	1.0198	1.0191	1.0183	1.0175	1.0167	1.0160	1.0152	1.0144	40
41	1.0203	1.0195	1.0187	1.0180	1.0172	1.0164	1.0156	1.0149	1.0141	1.0133	41
42	1.0192	1.0184	1.0176	1.0169	1.0161	1.0153	1.0145	1.0138	1.0130	1.0122	42
43	1.0180	1.0172	1.0164	1.0157	1.0149	1.0141	1.0133	1.0126	1.0118	1.0110	43
44	1.0170	1.0162	1.0154	1.0147	1.0139	1.0131	1.0124	1.0116	1.0108	1.0101	44
45	1.0159	1.0151	1.0143	1.0136	1.0128	1.0120	1.0113	1.0105	1.0097	1.0090	45
46	1.0148	1.0140	1.0132	1.0125	1.0117	1.0109	1.0102	1.0094	1.0086	1.0079	46
47	1.0138	1.0130	1.0122	1.0115	1.0107	1.0099	1.0092	1.0084	1.0076	1.0069	47
48	1.0127	1.0119	1.0112	1.0104	1.0096	1.0088	1.0081	1.0073	1.0065	1.0058	48
49	1.0116	1.0108	1.0101	1.0093	1.0085	1.0077	1.0070	1.0062	1.0054	1.0047	49
50	1.0105	1.0097	1.0090	1.0082	1.0074	1.0066	1.0059	1.0051	1.0044	1.0036	50
51	1.0095	1.0087	1.0080	1.0072	1.0064	1.0056	1.0049	1.0041	1.0034	1.0026	51
52	1.0084	1.0076	1.0069	1.0061	1.0053	1.0045	1.0038	1.0030	1.0023	1.0015	52
53	1.0073	1.0065	1.0058	1.0050	1.0042	1.0035	1.0027	1.0019	1.0012	1.0004	53
54	1.0063	1.0055	1.0048	1.0040	1.0032	1.0025	1.0017	1.0009	1.0002	.9994	54
55	1.0052	1.0044	1.0037	1.0029	1.0021	1.0014	1.0006	.9998	.9991	.9983	55
56	1.0042	1.0034	1.0027	1.0019	1.0011	1.0004	.9996	.9988	.9981	.9973	56
57	1.0031	1.0023	1.0016	1.0008	1.0000	.9993	.9985	.9978	.9970	.9962	57
58	1.0021	1.0013	1.0006	.9998	.9990	.9983	.9975	.9968	.9960	.9953	58
59	1.0010	1.0002	.9995	.9987	.9979	.9972	.9964	.9957	.9949	.9942	59
60	1.0000	.9992	.9985	.9977	.9969	.9962	.9954	.9947	.9939	.9932	60
61	.9990	.9982	.9974	.9967	.9959	.9951	.9944	.9936	.9929	.9921	61
62	.9980	.9972	.9964	.9956	.9949	.9941	.9934	.9926	.9919	.9911	62
63	.9969	.9961	.9954	.9946	.9938	.9931	.9923	.9916	.9908	.9901	63
64	.9958	.9951	.9944	.9936	.9928	.9921	.9913	.9906	.9898	.9891	64

JUNK ISN'T JUNK... Not at Texas Gas' Benoit Station

ALL THAT GLITTERS is not gold. That's a well known adage.

But maintenance men at Texas Gas Transmission Corporation's Benoit station learned something else, too—everything in the station scrap pile isn't junk.

As a matter of fact, Benoit Station Manager E. G. Davis, Maintenance Foreman H. W. Free and Repairman H. P. Bayless, Jr., went to the Benoit scrap pile, picked up what had been thought of as junk, and made a way to save money on engine power rod packing replacements.

For years it had been considered necessary to replace the power rod packing at least every two years. Millions of strokes of the power rod had caused the packing to wear and become loose. When this happened the packing was tossed onto the scrap pile and new sets, costing $90 to $110 each, were installed.

With 24 sets of packing required in the station's engines, this meant a replacement expenditure of about $2-400 each two years.

Thinking about all this waste caused Davis, Free and Bayless to put their heads together. Bayless sat down on the repair shop floor, took a piece of soapstone, and began to draw.

Next came a search of the scrap pile for an engine packing gland. Bayless converted it into a jig consisting of three pieces—a fixed head, a centering head, and a lock.

With this device, plus the station's lathe and the lathe's ordinary tool bit, it is possible to rebore power rod packing that otherwise would have been thrown away.

The fixed head with its lock is held in the lathe chuck. The centering head, mounted in the lathe line center hole, holds the worn pieces of packing in proper position while the lathe's chuck wrench is used to tighten the lock. Then when the centering head is removed the tool bit goes to work.

Within a short time after the jig was completed ten sets of packing that had been on the scrap pile had

A good look at the station scrap pile may save real money on maintenance. One salvage job at Texas Gas Transmission Corp.'s Benoit station yielded 24 reclaimed sets of engine power rod packing, worth $100 each. Here, Benoit Repairman H. P. Bayless, Jr., found—junk isn't junk.

Bayless got down on the repair shop floor, used it as drawing board in developing jig.

been reclaimed and were back on the stockroom shelves, ready for use when needed.

Last summer, when the station was shut down for seasonal overhaul of engines, the packing was removed from them and was rebored. Some of the '24 sets were ready for the scrap pile. Others would have been consigned to it by the coming summer if this hadn't been done.

Never again will things on the Benoit scrap pile be considered junk.

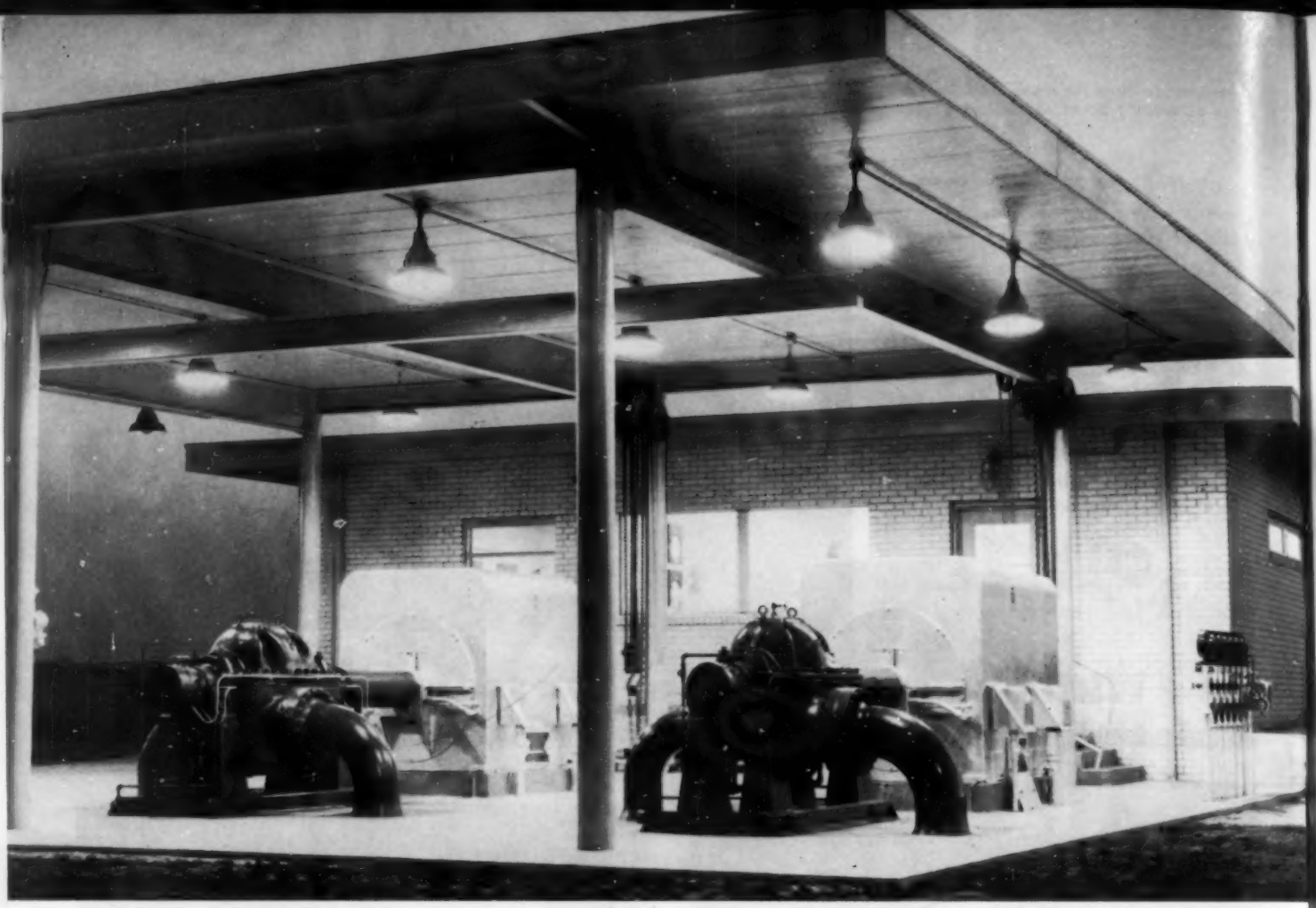
ACKNOWLEDGMENT

Reprinted with permission of *The Line Walker*, employe publication of Texas Gas Transmission Corp., Owensboro, Ky.

With one salvage idea, Texas Gas Transmission maintenance men will save $2400, in two years.

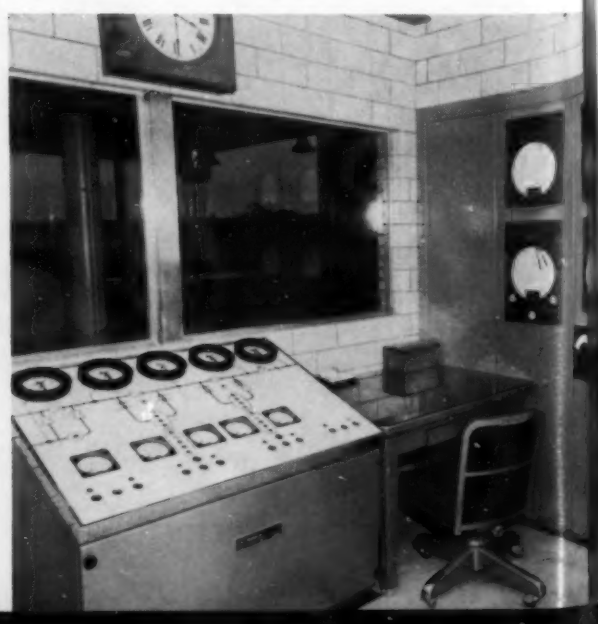
Bayless, Maintenance Foreman H. W. Free and Station Manager E. G. Davis got the idea that became a money-saver for Texas Gas. Above, they dream up a jig for reclaiming engine power rod packings. Below, Davis, straddling the giant piston, shows where packing fits onto the power rod, just off the power piston.

The completed jig. He holds the lock, stationary head is attached to lathe. At this point centering head holds packing in place.



How To Modernize A Pump Station—And Save!

Views of the identical Bowie and Healdton stations of Service Pipe Line Company. Top is the canopy which provides an overhead crane for maintenance. Left is the rear station yard's pump suction and discharge valves and suction booster pump. Valves are automatically sequenced and can be controlled either at valve or console room inside building (lower view). Here, an operator can automatically control station main units operation. A single pushbutton places each unit on the line, controls suction and discharge valves.



. . . SAVE THE TANKAGE AND PIPING —AND BUILD A NEW AUTOMATIC PLANT

That's what Service Pipe Line did!

By CARL I. HUSS,
Service Pipe Line Company

SERVICE PIPE LINE Company's Bowie (Texas) station, electrically-powered and automatically-operated, is setting the pace in modern design. It was erected at the site of the old station and existing tankage, yard lines, and other facilities are being used.

The compact station arrangement, type of equipment, automatic operating controls, and protective devices permit one man on tour to operate the station. Maintenance time is low because of these same design features.

Bowie Station receives pumpings from Graford, 50 miles south, and from Rochester, 115 miles west of Bowie for relay to the Healdton station in Oklahoma. Healdton and Bowie stations are exactly alike and were built at the same time.

The station is designed for single system and single grade operation. However, the tank and receiving manifold design permits batching and the design will permit the addition of a second system at minimum cost.

Summer line capacity between Bowie and the injection point at Healdton is 3470 barrels per hour with 860 pounds per square inch discharge pressure at Bowie. With its two 1000-horsepower mainline units and 100-hp suction booster, Bowie can pump over 5000 b/h at 860 psi. The maximum pressure limit of 860 psi is established by the lap-weld 8-inch line.

Figure 1 shows graphically the relation of line capacity to pump head-capacity with the pumps trimmed to annual average line limit.

Figures 2 and 3 show the general operating characteristics of the mainline pumps.

Shortly after the Bowie station went on the line, the trim in No. 1 pump was reduced to 11¼ inches. Figure 1 also shows line capacity versus the combined pump head-capacity with 11¼-inch impellers in No. 1 and 13-inch impellers in No. 2.

Figure 4 shows capacities from Bowie to Paul's Valley, Okla., with Healdton bypassed.

Presently forecasted pumping calls for an average of 64,000 b/d. This will require operating both units most of the time.

Main Units. The two mainline units are horizontal centrifugal pumps driven at 3550 revolutions per minute by 1000-hp electric motors. The outside installation of these large, mainline units with only a canopy for weather protection is new in pump station design.

The pumps operate singly or in series. At the time the pumps were ordered, a capacity increase was planned for the Bowie-Healdton section. Therefore, the pumps were trimmed to a duty point above present line capacity when operating in series. Shortly after the station was started, the impellers in the No. 1 pump were cut to 11¼ inches diameter. With 13-inch impellers in one pump and 11¼-inch in the other, the two units operating in series with the suction booster deliver 3270 bh of 40° API, 42 SSU crude at 835 psi differential pressure.

Two impeller patterns are available and Figures 2 and 3 show operating characteristics of each.

The pumps are 10″ x 12″ x 13″, two stage with double suction impellers and double volute, 2000 psi test steel cases. The suction nozzle is 12-inch ASA 600 and the discharge nozzle is 10-inch ASA 600. Radial shaft bearings are babbitt lined, bronze backed and ring oiled. The double-row ball thrust bearing is located on the outboard end of the pump. Mechanical seals pack the pump shaft. Pumpage cools the bearing lube oil and lubricates the seals. The pumps are direct connected to the motor through a floating shaft assembly. The pump half of the flexible coupling is taper bored to permit easy removal from the pump shaft. Protective devices shut down the motor to prevent pump damage in case of low suction pressure, high case pressure, high case temperature (hot oil), high bearing temperature and excessive seal leakage.

The motors are 1000-hp, 2300-volt, three-phase, 60-cycle, squirrel cage induction type operating at 3550 rpm under full load. They have a service factor of 1.15. It is of the "weather-protected" type and self ventilated. Protective shutdown devices include: (1) motor overload; (2) low lube oil pressure; (3) high bearing temperature. Motor speed torque characteristics versus expected pump speed torque characteristics are shown in Figure 6.

The mainline pumps and motors

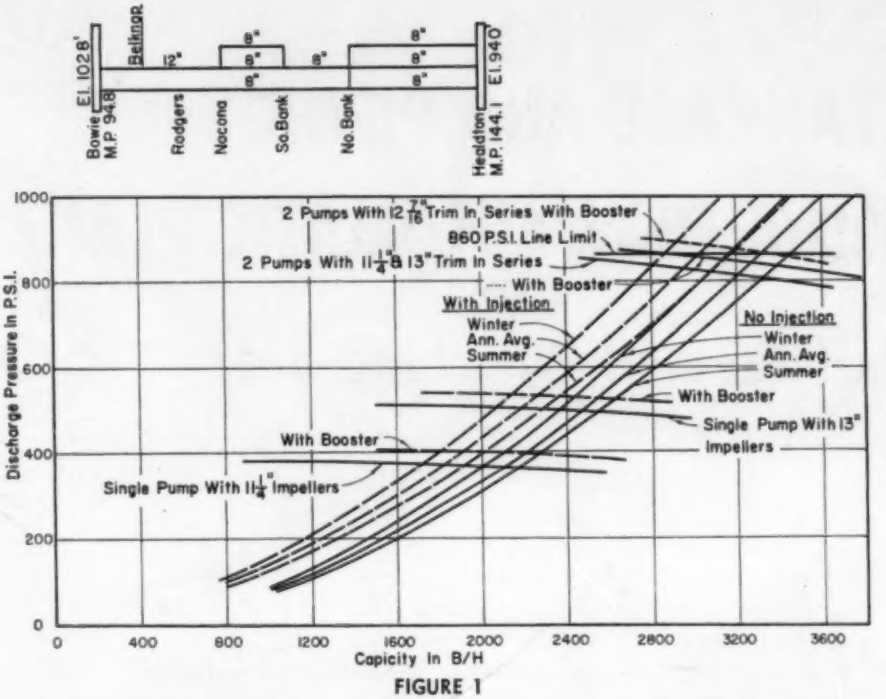


FIGURE 1

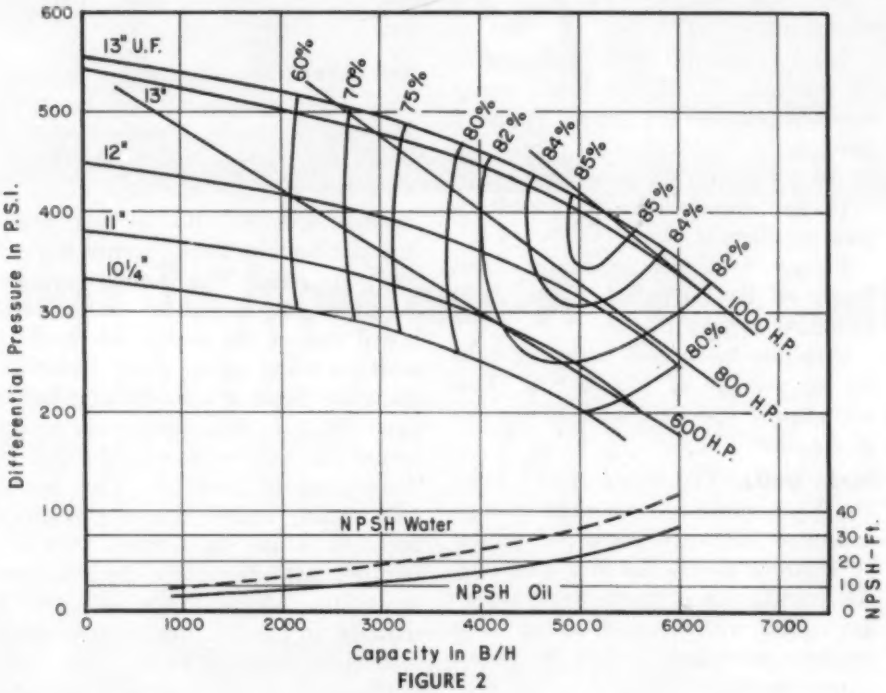


FIGURE 2

can be interchanged with those north of Drumright, Okla., without revising the pump and motor foundations.

Incoming Lines and Traps. Three 8-inch lines bring Graford's pumpings into the station site and incoming traps. There are orifice fittings in each of the Graford 8-inch lines on the station side of the traps. Beyond the orifice fittings, the three 8-inch lines are tied into a 12-inch header and the combined stream enters the receiving manifold through a single 12-inch line.

The Rochester stream enters the station site through a single 10-inch. This stream is metered on the station side of the trap and enters the receiving manifold through a single 10-inch crossover.

The trap design is for continuous operation. Traps are of the tilted type. The use of quick couplings rather than bolted blind flanges speeds scraper removal.

Incoming lines and traps are equipped with valves and fittings to withstand bypass pressures. Relief valves protect only the incoming lines and traps.

Suction and Receiving Manifold. A 100-hp vertical turbine type pump supplements the suction pressure to the main units. This is a two-stage 20-inch CC 12-inch PO pump driven at 1160 rpm by a direct connected 100-hp, 440-volt motor. The pump, as trimmed, develops 33 psi differential head when delivering 3500 bh of 0.825 SP.G. oil. Pump characteristics are shown by Figure 5.

The piping is manifolded to take suction on tankage or the incoming streams. Manually operated suction and discharge valves and the synthetic rubber seat check are ASA 300 to withstand by-pass pressures. Should Bowie be bypassed, the suction booster pump must be isolated since the pump head, casing and strainer are rated at ASA 150.

Although valves are manually operated, the pump motor may be started and stopped from the station building or switchgear as well as at the pump.

Protective devices shut down the unit in case of low suction pressure, hot oil and high discharge pressure.

The use of the suction booster allows lower tank working bottoms. Positive suction pressure is furnished the main pumps under all conditions of pumping. Also, the differential added by the suction booster permits a slightly higher discharge rate with only one main pump operating.

Pump Suction and Discharge Manifold. The main pump suction and discharge manifold has a single 16-inch header to which the unit suction and discharge lines connect. Each unit suction and discharge line is separated by a synthetic seat check valve in the main header.

The No. 1 unit valves are ASA 300. The No. 2 unit suction valve is ASA 300, while the discharge valves and checks are ASA 600. Thus, the discharge side of the manifold is good for 1200 psi operating pressure.

Motor operators on each suction and discharge gate permit remote control of these valves. Valve operation can be controlled from the station building, from the motor control center, or at the valve. Valves may also be manually operated by engaging the handwheel operated gear train with the clutch on the motor operator. The mechanism is arranged to prevent injury to an operator at the valve by automatically releasing the handwheel drive when the motor is started.

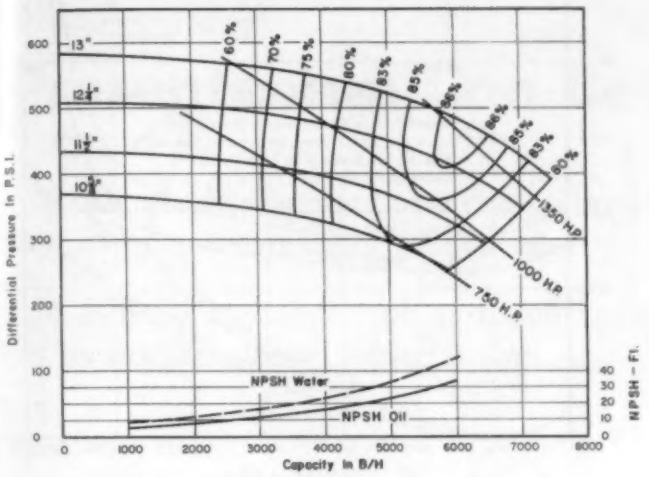


FIGURE 3

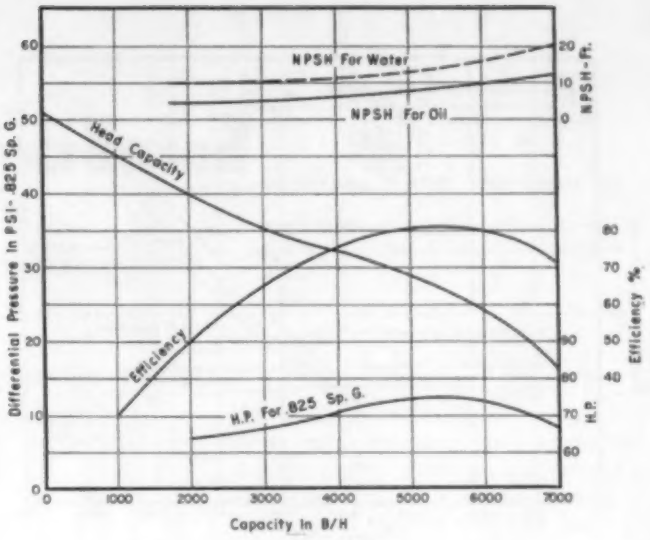


FIGURE 4

Also, should the hand wheel drive clutch be engaged for manual operation, it can be released only by the running motor. The motor valve operators are equipped with limit switches actuated by cams. These are driven by a gear train synchronized with valve stem travel. Thus, as many as 16 station operating functions, or signals, can be synchronized with the valve's position.

A torque switch controls valve seating thrust. A position limit switch backed up by a torque switch controls valve opening. Motor operators are of sufficient capacity to unseat the valve with the full rated working pressure as differential across the seats.

Outbound Lines and Traps. The station's outbound stream is metered in a single discharge line and tied into both the 12-inch and 8-inch outbound lines to Nocona Junction. The discharge pressure is limited to 860 psi by the lap weld pipe in the 8-inch line. The arrangement of the discharge system and pump piping allows for future expansion.

Tanks, Tank Lines and Junctions. The station has two 55,000 and one 17,000-barrel working tanks. Tank bottom elevations vary from machinery slab grade to eight feet above this grade. By utilizing the suction booster full suction rates to four-foot working bottoms are possible.

Existing tank lines have been arranged so that each tank has its separate working barrel in the manifold. The 10-inch and 12-inch lines serving tank 471 are looped to the old junction. At this point they are tied together through a crossover and continue to the manifold as a single 12-inch. A single 12-inch line connects tank 6401 to the manifold. The 12-inch to tank 467 ties into a 10-inch line to the manifold. This line is looped with the 8-inch connecting tank 467.

Tanks are gaged remotely by means of electronic gages. A single receiver in the control office enables an operator to gage from 1 to 10 tanks. A telephone jack on the receiver and another on each transmitter is provided to operate a plug-in type sound powered telephone. Also, a high and low level switch can be set at any desired level in each tank, and when that preset level is reached, a red indicating light comes on and remains on until the level of the tank is returned to within its preset limits.

Substation and Switchgear. Power for the pump station is furnished by the Texas Electric Service Company through the use of their 66/2.4 kv substation located at the pump station site. The substation consists of a wooden pole structure arranged for the termination of a 66 kv service line. The structure feeds three 667 kva, 66/2.4 kv, single-phase, 60 cycle, oil cooled transformers.

Power from the three transformers is brought underground by 5000 volt aluminum cables, lead covered, to a set of 2400-volt, 3-phase, oil break, vertical lift, all-metal clad, outdoor switchgear.

The outdoor switchgear is comprised of five cubicles located adjacent to the power company's substation and arranged in such manner that more cubicles may be added in event of increased future load requirements. One cubicle is utilized for the termination of the incoming feeder from the substation to the switchgear busses.

A second cubicle houses the switchgear control transformer, voltmeter, three-phase selector switch for measuring the voltage on each of the three phases, battery and trickle charger, ground indicating lights, single and reverse phase voltage relay, and lighting and surge protective equipment.

The three remaining cubicles contain 440 ampere oil circuit breakers rated at 50,000 kva interrupting capacity. Two of these are used for controlling the main line units and the other is utilized for control of power to a 300 kva, 2300/440 volt transformer which supplies three-phase 440 volt service to the motor control center.

Each motor starter cubicle employs the use of indicating kilowatt meter to permit reading of the power being consumed by the motor, indicating single-phase ameter connected through a three-phase selector switch to permit reading of the current in each of the three phases, over-current relay to protect the motor from overload, thermal overload relay to protect the motor from over heating, control switch for the motor circuit breaker, and red and green lights indicating the "open" or "closed" position of the circuit breaker.

The 300 kva transformer feeder breaker cubicle utilizes the same metering and protective features as the starter cubicles with the exception of

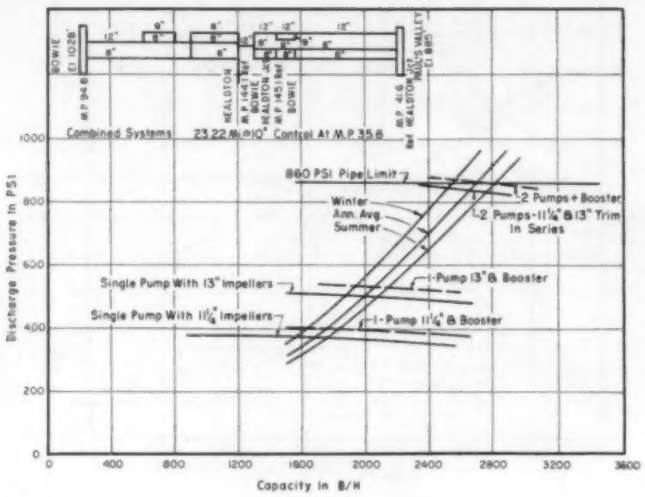


FIGURE 5

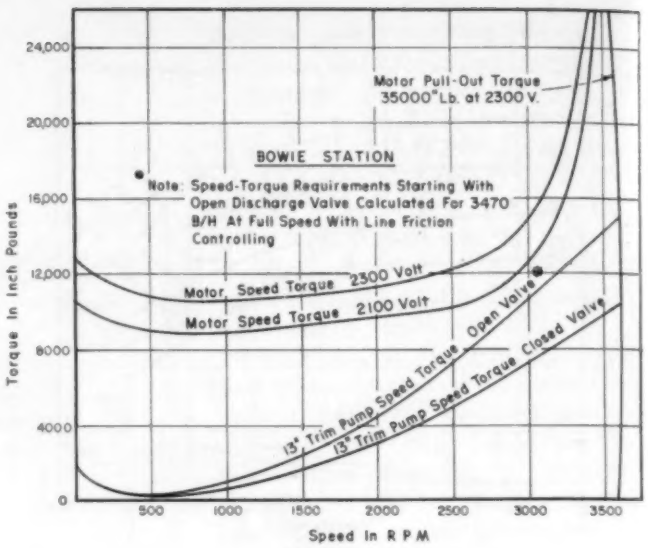

Motor Pull-Out Torque
35000 Lb. at 2300 V.
BOWIE STATION
Note: Speed-Torque Requirements Starting With Open Discharge Valve Calculated For 3470 B/H At Full Speed With Line Friction Controlling
Motor Speed Torque 2300 Volt
Motor Speed Torque 2100 Volt
13" Trim Pump Speed Torque Open Valve
13" Trim Pump Speed Torque Closed Valve
Torque in Inch Pounds
Speed in R P M

FIGURE 6

the kilowatt meter and the thermal overload relay.

The 300 kva, 2300/440 volt transformer is throat connected to a weatherproof, 480-volt motor control center made up of standardized units arranged in stacks or tiers. The control center contains a 25 kva, 480-120/240 volt transformer for station lighting and heating, controllers for the motor-operated valves, and starters for the suction booster pump, suction pump, sump pump, and air compressor motors. The necessary pushbuttons for controlling the valves and motors and for resetting the motor thermal overloads are mounted on the starter panels.

Automatic Sump. The station has a 10-barrel sump that collects gland leakage and accumulation from around the machinery. A 1½-hp vertical turbine pump mounts on the tank and is automatically started and stopped by a flow switch according to tank liquid livel. The pump will handle 20 gallons per minute of 0.825 SP.G. crude oil at 39 psi differential pressure. The pump discharges into tank 471 through the suction pump discharge line and the 10-inch tank line.

Station Suction Pump. The suction pump is a rotary pump rated at 200 gpm at 40 psi discharge pressure. It is driven at 375 rpm through a V-belt drive by a 10-hp, 1800-rpm, 3-phase, 60-cycle, 440-volt, explosion-resistant motor.

The suction pump suction line is connected to the traps, manifold and all yard lines to permit evacuation of these lines. The pump discharges through a 4-inch and 6-inch line into tank 471 via the 10-inch tank line. It is manually started and stopped by a locally mounted pushbutton station.

Control Building and Canopy. The 18′ x 36′ masonry control building houses the office and parts storage space together with station operating control instruments and the control console.

Office space is separated from the storage space by control instrument vertical panels and a masonry wall partition. The storage space houses the air compressor, air filter and drier in addition to storage bins and work table. Station operation normally is controlled from the console and the instrument panel in the office space. All operating conditions may be observed at the console and the instrument panels.

The 38′ x 42′ canopy offers partial weather protection to the main units. It serves as a structure to support machinery hoists and their loads. One 4-ton hoist travels transversely above the pumps and one 8-ton hoist travels over the center line of each motor. The canopy covered space is large enough for three units.

Station Protective Devices. The following protective devices shut down the entire station:

1. Low suction pressure switch 15 pounds per square inch gage.
2. High discharge pressure switch. (Also mercoid switch) 880 psig.
3. Instrument air failure (from pressure switch on air supply line) 35 psig lights indicating lamp. 18 psig shuts down station.
4. Power fault, (undervoltage, overvoltage, phase reversal).

The following protective devices shut down individual units only:

Main Line Units:

1. Pump inboard bearing temperature switch 160° F.
2. Pump outboard bearing temperature switch 160° F.
3. Pump case (hot oil) temperature switch 130° F.
4. Pump seal leakage float switch.
5. Pump case pressure switch.
6. Motor inboard bearing temperature switch.
7. Motor outboard bearing temperature switch.
8. Motor lube oil pressure switch.
9. Motor overload.
10. Low DC tripping voltage.

Suction Booster Pump:

1. High case (hot oil temperature switch) 130° F.
2. Low suction pressure switch.
3. High discharge pressure switch 40 psig.
4. Motor overload.

In addition the temperature of the motor coil windings is determined by six detector coils evenly spaced around the circumference of the motor stator.

Instrumentation and Controls. Pneumatic transmission of pressure intelligence speeds response of final control and eliminates the hazards of oil in the control room. Pneumatic pressure transmitters mounted outside the control room receive hydraulic pressure from the booster pump suction, station suction, No. 1 and No. 2 unit case and station discharge.

There are six pressure transmitters.

Pumping is controlled to maintain a safe minimum suction pressure and a safe maximum discharge pressure by automatically throttling the outbound stream.

The suction and discharge pressure controller is a pneumatic single pilot, dual pen instrument.

Two recorders chart a daily record of Rochester's incoming flow rate and of Bowie's discharge flow rate. A two-

Continued on Page 58

Presenteeism Can Be Increased

- **Avoidable absenteeism is caused largely by conditions that can be controlled or influenced.**

- **It is the manager's job to discourage absence of workers by finding causes, taking action.**

By AUREN URIS,
National Research Institute, New York City

MANAGEMENT PEOPLE *have* burned a lot of midnight oil trying to work out remedies for absenteeism:

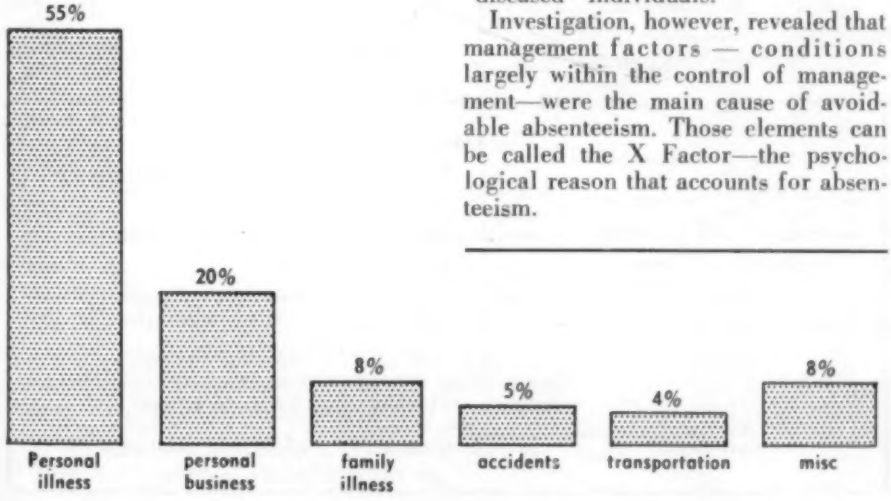
CASH AWARDS. One company developed a system of bonuses to employes for perfect attendance. But it caused trouble: Employes came to work when they *should have* remained home; a worker who *had* to stay out for a perfectly good reason developed a sour outlook on the whole thing.

THE "SHAME-THEM" APPROACH. The company posted the names of absentees on bulletin boards. Results were not satisfactory. Employes resented being held up to public ridicule.

THE SALT MINES. All-time record goes to the Soviet Union. In Russia, absenteeism gets the Siberia treatment.

Even this extreme penalty doesn't put an end to the problem. Absentees still add to the population in the labor camps.

Reasons and Figures—Studies of large numbers of absentees over periods of time generally give this kind of picture as to reasons for absence:



Statistics like these are interesting, though not always helpful. The trouble is, these figures often hide as much as they reveal. One man says he "couldn't come to work because of a headache." A week later he refuses to go home despite a temperature of 101—"because I've got an important job to finish." What accounts for contradictions of this kind?

Studies by psychologists show that there is an intangible factor causing absenteeism which frequently eludes the statisticians.

The X Factor—Bernard J. Covner in the *Harvard Business Review* relates the about-face in one company's thinking after it really studied its absentee difficulties. Management began by hoping it could find a "convenient means for getting rid of worst offenders, and preventing the hiring of potential offenders."

According to their view, absenteeism was a specific ailment, like shingles or athlete's foot, that afflicted certain individuals. The way to stop absenteeism, then, was simply to get rid of the "diseased" individuals.

Investigation, however, revealed that management factors — conditions largely within the control of management—were the main cause of avoidable absenteeism. Those elements can be called the X Factor—the psychological reason that accounts for absenteeism.

The X Factor is an integral part of the work scene—in your company, in every company. It figures in the conditions under which an employe does his work. And here we don't mean the lighting, or the color of the paint job on the walls. We're talking about the "emotional conditions," the feelings that exist among employees, and between supervisor and worker.

Many management men, as a matter of fact, can actually "feel" the presence of absence of the X Factor in a given department or company. A calm efficiency, an easy friendliness among the personnel shows the X Factor is present, as surely as the clicks of a geiger counter reveal radioactivity.

How do you build attendance-encouraging conditions on the job? A recent study of the relationship between attendance and department size, Table A, gives one revealing answer:

TABLE A

Number of Employes Working in Department	Percent of Employes Having 1 or More Absences per Month
1— 9	7.9
10—19	14.8
20—39	24.6
40 or more	30.2

According to these figures, the smaller a work group, the better its attendance. One likely reason is that the X Factor—good inter-personal relations—is more easily achieved in small groups.

The employes in a small unit tend to develop a stronger feeling of friendliness, of belonging to a team. An individual is more important on a five-man team than he'd be on a 20-man team.

Supervisor-Employe Relations—Actually, the ordinary day-to-day activity has a profound effect on the emotional atmosphere on the job.

Take the case of Arthur Sweet, getting out of bed on Monday morning. His wife is still asleep—just as tired as he is. The night before they had been at her sister's wedding and they

How Much Do You Know About Absenteeism?

If your top executives can answer the questions below, especially No. 9, chances are, absenteeism in your company is under control.

1. Which day of the week generally shows the highest rate of absence?
2. Which the lowest?
3. Which rate of absenteeism is considered to be "normal"?
4. Is *length* of absence more important than *frequency?*
5. Is sex a factor; that is, do you find a higher or lower absentee ratio among women than men?
6. What is an "excused" absence?
7. Is there a connection between absenteeism, turnover and injury rates?
8. Why can't absenteeism generally be handled by simply cracking down?
9. *Is management itself responsible for absenteeism?*

Answers on Page 43

had danced until two in the morning.

Sweet goes to the mirror to shave. He looks himself in a blood-shot eye, asks: "To go to work or not to go?"

How he answers that question will depend on the balance he strikes between the negative factors and the affirmative.

NEGATIVE: the bad taste in his mouth, the aching bones, the fuzzy head. If these were the only factors, he'd stay home.

But Arthur Sweet this Monday morning is a man with a background of accumulated experiences, all of which are like little weights thrown into the scale on which his decision is being weighed. Each of them may be small; the question is how they will add up.

AFFIRMATIVE: Somewhere in the back of Sweet's head, these items are adding a little weight to the scale of "presenteeism":

When he first came on the job, Mr. Williams, the foreman,

. . . gave him a lot of personal attention;

. . . was always available when Sweet needed a hand.

In the following months, Williams

. . . helped him make friends with the others on the job;

. . . participated in the casual social life of the work group;

. . . showed consideration for his requests, complaints and suggestions.

And so on. To round out the picture, just add all the items you can think of that make a man feel he's doing a job, not merely holding down a job.

Consider the following three steps in analyzing your company picture and tracing your absenteeism to basic causes:

1. Get the Figures—Calculating the rate of absenteeism is the obvious starting point. The formula to use is—

$$\text{percent of absenteeism} = \frac{\text{man-days lost}}{\text{man-days scheduled}} \times 100$$

Company A has 100 employes, each scheduled for eight hours, 24 days of the month. Checking monthly attendance records shows that 210 man-days were lost.

The total man-days are 100 (number of people scheduled) multiplied by 24 (number of workdays in the month) or 2400. Filling in the formula the final calculation would be—

$$\text{percent of absenteeism} = \frac{210}{2400} \times 100 = 8.75 \text{ percent}$$

Questions that often come up in figuring this frequency rate are:

. . . Should excused absences be included? Yes. If they're not, you don't get a true picture.

. . . How about absence that's unavoidable because of serious illness, etc.? That should also be included. The U. S. Bureau of Labor defines absenteeism as "the failure of workers to report on the job when they are scheduled to work—that is, when they are actually 'on the payroll.' "

2. Evaluate the Figures—In some cases, an absentee rate of 10 percent may be okay. In others, five percent would call for immediate action. Take the three different departments shown in Table 1. Each has the same number of employes, and the same number of man-days scheduled.

Note that although all show the

TABLE 1

A	B	C
1 man out 14 days because of serious illness.	6 man-days lost. Employe out because of asthma attack.	5 workers out one day each for "personal business."
	1 man-day lost. Employe had to appear in court.	5 workers out one day each, "headaches," "upset stomaches," etc.
	7 man-days lost. Two working mothers tending to sick children.	4 employes out one day each. Transportation.
14 man-days	14 man-days	14 man-days

same number of days lost, it's Department C that needs special action.

3. Spotlight the Bad Actors—Absenteeism is usually confined to a small percentage of employes. By using the absentee frequency rate, you can spot them.

Here's how it would work on a departmental basis. Here's a typical list:

Name	Days absent for month of.....
Tom	0
Bill	0
Harry	1
John	5

By simply glancing down this list, you can spot the absentee troublemakers. But be sure not to assume that these individuals are staying out wilfully. They have problems that are keeping them out. The question is how to tackle these problems.

Handling the Absentee—Once you've drawn a bead on the individuals causing your absenteeism, you're in a position to apply additional remedies. You have to work more closely with them, to solve what's essentially a mutual problem.

It's a good practice to have a returning employe see his supervisor before starting work. Whether the interview lasts for one minute or 30, the first objective is to establish the *reason for the absence.*

If the supervisor is unconcerned, the employe will adopt a "what's-the-difference" attitude. Regardless of the reason for the absence, you want the employe to know he was missed. Then, if he was away for good reason, he'll be pleased to know he's important to the work. If his reasons aren't quite good enough, he'll recognize the implied rebuke.

As one supervisor put it: "By making a point to talk to every returning absentee, I make it clear that I know they've been out. And one employe who used to have a bad attendance record told me the other day, 'You made me run out of excuses.'"

Attacking the Cause—(a) The condition. Let's say, for example, a worker says he's been forced to stay away because of bad weather and overloaded local transportation facilities. You may be able to suggest other ways of making the trip. This is especially true of new employes who aren't familiar with the neighborhood.

(b) The work schedule. You may want to consider changing an employe's hours if an outside situation makes it difficult for him to report in with the others.

(c) The job. In cases where a specific on-the-job condition is at the bottom of the absence, you may be able to remove the obstacle either by re-assignment or by modifying the work itself.

(d) The employe's attitude. You may decide on the basis of your investigation that the cause was not so much any one single factor but the employe's attitude. Frequently, for example, in the case of the transportation hardship, pointing out that other employes have similar—and even worse—problems may help to influence him.

Consider action in the extreme cases. The employe who poses a continual attendance problem may finally have to be disciplined. What you finally decide should grow out of the facts of the case. Don't "make examples."

You may simply have to get tough and choose between further efforts to straighten him out and firing him.

In a period of general labor scarcity it's logical to prolong the straightening-out effort. Four days work out of five is better than none. But watch out: one man's poor attendance may infect others with absenteeism.

The Cost Factor—It's sometimes cheaper to put up with the absenteeism than to remove the cause. It's not a happy decision—but there may be no choice. Take the case of the company that suffered high absentee rates in bad weather. Lack of near-by parking space meant that employes had to walk five blocks through snow and cold.

Build a parking lot? The costs were simply too high.

In many cases, though, specific moves on your part can and will make a substantial difference.

Answers to Quiz

1. There's more absenteeism on Mondays.

2. Payday.

3. According to the U. S. Department of Labor: "Nobody knows what 'normal' absenteeism is."

Company A feels it's doing fine if the absenteeism rate doesn't go over 5 percent. Company B's executives start having ulcers if the rate pushes 3 percent.

4. Frequency is generally considered a better measure of the problem. One employe, for example, stays out for 20 days because of illness. Another employe stays out ten different times totalling the same 20 days. It's usually easier to adjust to a single absence of long duration.

5. Women present more of an absentee problem. For example, in one departmental study, investigators found that 12.5 percent of the men had one or more absences, against 27.3 percent of women.

6. "Excused absence" covers the cases where an employe's request for permission to stay out has been okayed by the supervisor. There is no single rule for excused absences. Custom varies from company to company.

7. Many companies have found that absenteeism, turnover and injury rates rise and *fall* together.

8. Attempts to decrease absenteeism by stern discipline occasionally have proven effective. However, resultant grievances and generally low morale often became as bad as the original absenteeism.

9. The answer to this question lies at the very heart of the entire absentee problem. The fact is—

. . . poor management, specifically poor supervision, *does cause* absenteeism;

. . . good management, especially good supervision, *causes presenteeism.*

—The End.

HOW TO CONTROL FIRE

There are two ways:

- **Purge the line with inert gas.**
- **Control the amount of leakage at the open cut through a steel valve. The second method is called "fire control". As a rule, it is more practical. Here are the preliminary preparations for working on live gas mains.**

By G. CHABRE

Southern California Gas Company

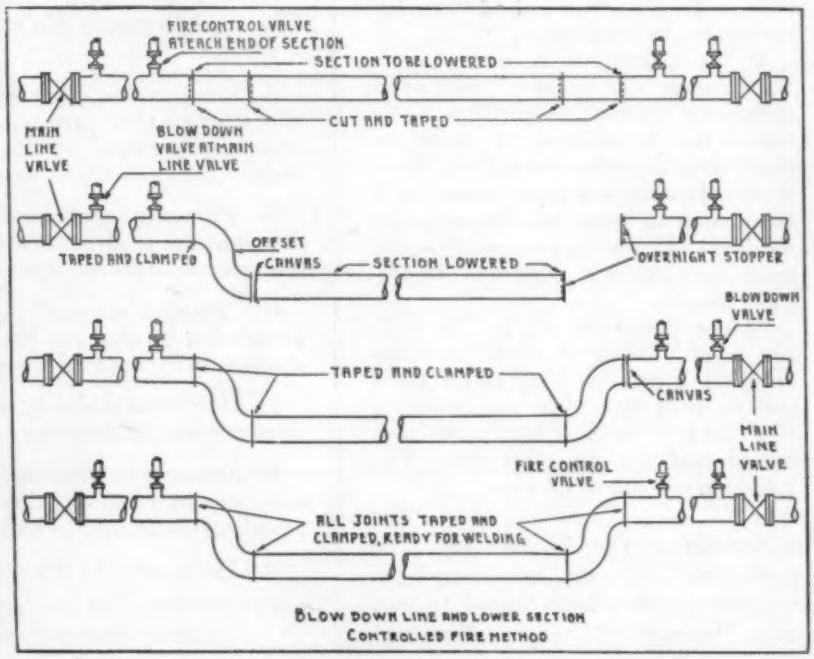


FIGURE 2 FIGURE 1 FIGURE 3

Here's how Southern California Gas Company handled the job when a 30" line had to be lowered for 200 feet because of new freeway construction. Sketch gives an idea of the scope of the job. Object was to complete final blow-down (see next pages for details). Figure 2 shows the excavation made and pipe line cribbed up for easy lowering. Figure 3 shows welder making a cut to gage height control of the flame. (Details on next pages.)

DURING PIPE LINE TIE-INS

How to eliminate the possibility of an explosive mixture? That is the first consideration when it becomes necessary to acetylene cut or arc-weld a gas pipe line. There are two ways to do this. One is to completely purge the section of pipe, replacing the inflammable gas with inert gas. The second one is to leave gas in the line and control the amount of leakage at the open cut through a stack valve at the job site.

The second method is termed "fire control." As a rule, fire control is the more practical of the two operations. Here are the preliminary preparations required for working on live gas mains. They are important and time-saving.

Supervision and Planning. Detailed instructions should be written covering every phase of the shutdown operations. A copy of these instructions should be given to each of the supervisors affected by the shutdown—the dispatcher, pressure engineer, supervisors in the field and such.

It is up to the field supervisor to see that the workmen on the job are properly instructed in carrying out instructions. He should conduct a chalk talk with all crew members the day before the shutdown.

Preliminary Maintenance and Installations. When the shutoff is to be effected by valves, precautions should be taken to see that valves are lubri-

cated properly and in good operating condition. The following should be done the day prior to the shutdown.

1. Install fire control valves next to the place where the cuts and welding will take place. These should be sized to take care of excessive leakage. Six-inch vents also help in expediting the final blowdown.

2. Check tie-in fittings. Make certain that proper excavation has been made and necessary blocking is available. This avoids delay on the day of the shutdown.

3. Prepare pipe where cuts will be made by cleaning wrapper and coating, grind longitudinal seam where bands will be installed, fit bands to the line, and mark the pipe for cuts.

4. Notify public authorities regarding the time of the shutdown and blowdown of gas. After proper contacts are made, notification can be made by telephone. If the job is in a congested area, notify residents near the job site. We believe this is an important phase of public relations. This prior notification is a help to public officials in answering telephone calls they receive from the public regarding unusual noises caused by the blowdown operation.

5. If necessary, purge the new section and have it full of gas for tie-in operation.

6. Check radio reception at locations where it will be used.

7. Make all final arrangements for equipment required on the job. Arrange for a survey party to check the excavation and fittings to see that they are being installed according to plan.

Shutdown and Blowdown of Gas

1. Clear with gas dispatcher approximately one hour before the schedule of shutdown so as to clear operations as planned.

2. Follow planned shutdown procedure.

Here will be discussed a job in which a 30-inch line had to be lowered for 200 feet because of new freeway construction. Figure 1 gives an idea of the scope of the job. There were two main line valves located about five miles apart with blowdown valves adjacent to the main line valves. The day prior to the shutdown, 6-inch fire control valves were installed and tapped out. Coating was removed and pipe cleaned at points where the main was to be cut, longitudinal seam was ground flush with pipe, and cuts were marked. On the shutdown day, personnel were dispatched to both main line valves ahead of actual shutdown time and radio contact was made. At the appointed time, the two main line valves were closed and the line blown down until the pressure reached approximately atmosphere. The permanent blowdown valves were closed and the control valves at the site were opened to complete final blowdown.

FIGURE 4

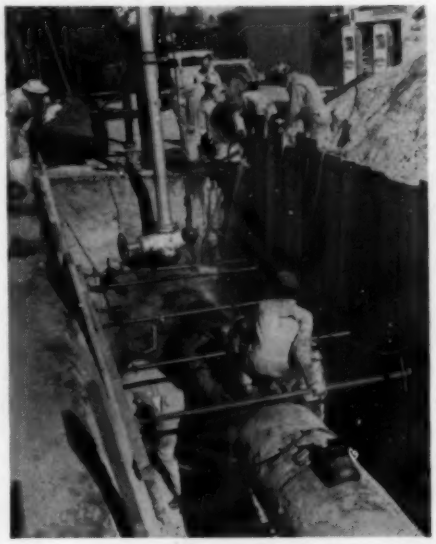


FIGURE 5

Figure 2 shows the excavation around and under the pipe, the trench carefully shored, and the pipe line cribbed up for easy lowering. During blowdown operation, two large cranes, especially rented for this job, were moved into place to support and then lower the line. A third small crane was used to remove the pups and lower in the tie-in pieces.

In Figure 3, when the vent stack showed a small amount of gas, the control valve was closed. The welder made a small cut at the top of the main to check on the fire control operator's ability to control the height of the flame. Prior to cutting operations, bonding wire was installed between the old and new sections of main. After a portion of the initial cut had been made, two small lugs were tacked into place across the cut portion so the piping would not drop when the cut was completed. Positionwise, the man on the fire control valve is adjacent to the welder, which enables him to control the height rang-

FIGURE 6

FIGURE 7

FIGURE 8

ing from about 6 to 24 inches of the flame, without having to give a signal. This is an important phase of fire control. Welders complete the cut in an upright position. And this gives them freedom of movement in case line jumps.

In Figure 4 the first cut has been completed and the welder moved back so that the flame could be extinguished.

The flame is extinguished with "Indian fire fighters"— in Figure 5. Fog spraying equipment or dew gas may be used, if available. The fire fighters perform an excellent job.

Figure 6 shows the flame extinguished. Workmen are using 4-inch friction tape to seal the cut. This is done after each cutting operation.

In Figure 7, the same cutting procedure is followed as the other, except that a double cut is being made so pieces can be knockout in case the pipe is tight. (The first cut is always a single cut in the event the pipe has a tendency to jump.)

Again the cut is being sealed with friction tape (Figure 8). After all the cutting is completed and sealed with friction tape, the crew moved to the lower end of the job and duplicated the procedure. This job was handled by the second fire control valve, so that it was immediately adjacent to the cutting. A single control valve is used if the job site is confined to an area less than 40 feet. If the history of the shutdown valves is good, this can be lengthened, provided the control valve operator can see the cutting or welding operation.

In Figure 9 all cuts are completed, the pup removed, and nite stoppers installed.

In Figure 10, the crew has moved to the other end of job to remove the pup, install stoppers, and lower section of main to proper depth. A survey party checked this for accuracy.

The new tie-in section (Figure 11) is being dropped into the hole. Just before it dropped into place, the over-

FIGURE 9

FIGURE 10

FIGURE 11

FIGURE 12

FIGURE 13

FIGURE 14

FIGURE 15

nite stoppers were removed and a wet canvas placed over the high end of the pipe and gas was allowed to drift until the air was purged from short section. Then canvas was pulled, wedding bands installed and tapped to seal in the gas.

Figure 12 shows the proper installation of bands to get a good fit. This is very important and it is done by the welder who knows what is needed to get a good weld. Load binders are used to pull up on bands and fit them properly. After each band is installed, friction tape is used to seal the joint. The same procedure was duplicated at the opposite end.

In Figure 13 the tape was removed from the first joint to be welded and the amount of gas checked to make certain that the quantity of leaking gas is controllable, the men were removed from the hole and the opening was flashed with a lighted acetylene torch from the top of the ditch and a fire started before the welder entered the bell hole to start welding. The control valve operator controls the height of the flame during welding similar to cutting operations. Fire control welding methods confines welding to one location until the weld is gas tight. Stringer beads are run to seal off gas and then the weld is turned over to contract welders for completion. Welders start work at the opposite end and complete as much welding as possible. Two welders are used on each weld. Only one open weld is worked on at a time.

After all the welds were made gas tight, the fire control valves were removed (Figure 14). The threaded bull plug to close the hole is handed to the man in the ditch, who will screw the bull plug into the coupling.

In Figure 15, welders are welding up the threaded bull plug to prevent future leakage. This is to avoid threaded joints on high pressure lines. The chance of using the same fire control valve at this location is rather remote. After welding was completed the line was immediately pressured, welds tested, and line placed in service because all portions of the line were gas filled. This is an important factor in favor of fire control operation. The line was blown down at 10 am, lowered, and was back in service at 8 pm. The job was completed.

Many have experienced difficulty in working on lines that contain liquids, although normally handling dry gas. Here the fire control method can still be used. A cut is made under the pipe to drain off part of the liquid after a "look through" hole, which was cut in the top of the pipe, indicated no liquid present. After sufficient opening, fire is extinguished and liquid is allowed to drain from the line and the "look through" hole is sealed with mud. The fire control valve is immediately adjacent to the cut. This type of cut is frequently mudded up behind the welder so as to concentrate the flame at one opening, making it easy to control through the fire control valve. This is an excellent example of the diversity of fire control methods because this type of condition would be hard to handle with any other method.

ACKNOWLEDGMENT

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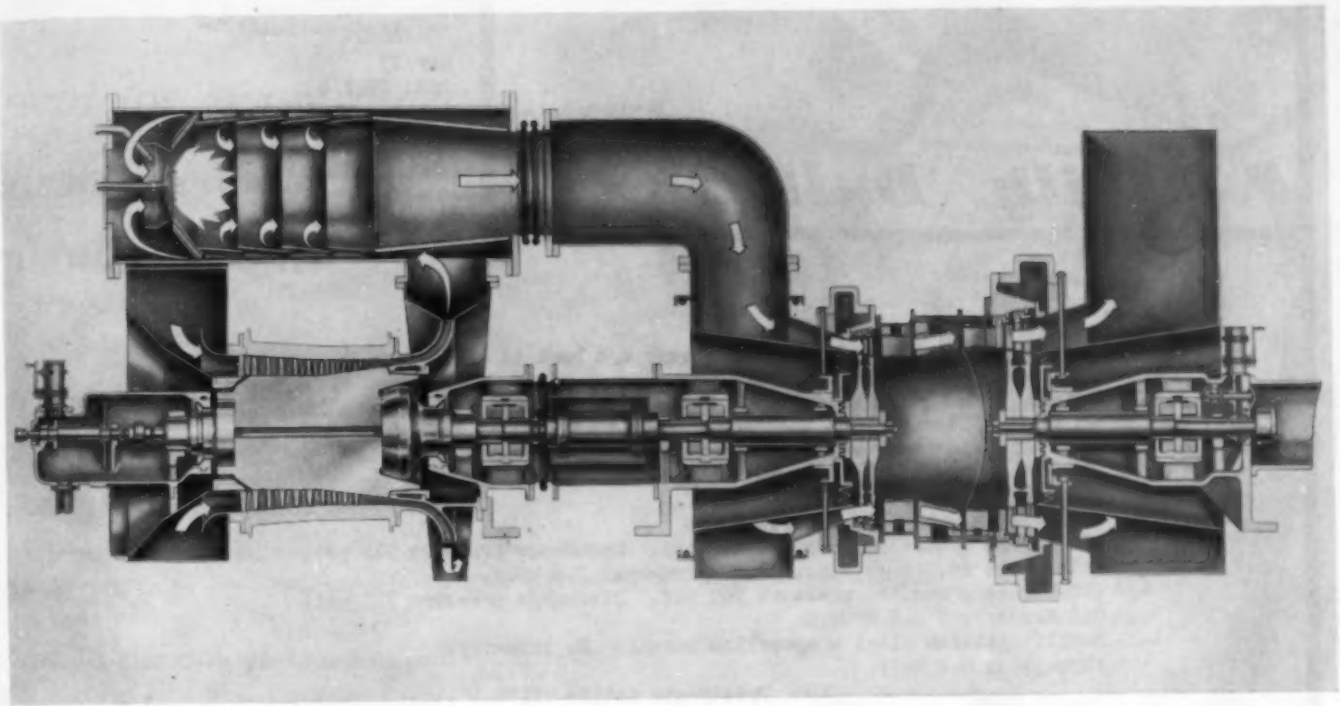


Cutaway diagram of new gas turbine. Note that air is used as an insulating material while it is picking up heat, which improves fuel economoy. Designers of this turbine claim that the fuel nozzles can be changed one at a time while machine is in operation.

New Gas Turbine May Have Application for Pipe Lines

Developed to drive a portable generator plant, this turbine uses axial-compressed air to cool and insulate combustion chamber and other hot air passages.

A NEW GAS TURBINE which utilizes air compressed by the axial to cool and insulate the combustion chamber and other hot air passages has been developed by Clark Bros. Company to drive a portable generator plant. Its developers are predicting that it will be adapted for use on the pipe lines.

The ingenious circulation pattern of the air not only serves as an insulation measure but also as an economizer. Even so, a regenerator heat exchanger can be added to the machine to increase fuel economy.

Coupled to the generator, the turbine is rated at 5500 kilowatts at full load with a station efficiency of 19 percent. This is approximately 7400 horsepower at 80° F. ambient and 1000 feet altitude.

Combustion air is supplied by a 13 stage axial flow compressor at a pressure ratio of 4.25 and a flow of 100 pounds per second. It turns at a speed of 5000 revolutions per minute. The machine has a split shaft and the load turbine turns at 3600 when the axial is turning at 5000.

The most novel characteristic of the turbine, according to its designers is the ease of maintenance. Stator blades are mounted in quarter circular rings which are easily accessible and may be rolled out of the casing for inspection. The rotor need not be removed.

Combustion of the fuel is accomplished in a single, highly stable contraflow combustion chamber. The single combustion chamber used gives the simplest possible arrangement without the matching difficulties of multiple chambers. The chamber consists of two shells forming an inner combustion area and an outer annulus.

Primary air flows through the outer annulus to the end of the chamber and enters the inner area where fuel is injected and burned. The secondary air passes from the outer annulus through openings into the inner chamber where it mixes with the products of combustion.

The air flowing through the outer annulus also cools the inner walls to a temperature consistent with long life. Combustion chamber liner changes are not required during the life of the turbine. Three fuel atomizers are supplied. To facilitate maintenance the nozzle installations are so designed that any area may be shut off and removed for cleaning or replacement while the turbine is in operation.

—The End

TEXAS ILLINOIS STOCK

May 23
Bid: 19 7/8
Asked: 21 1/8

Daily Bulletin

May 24, 1955

Item

(1) Messrs. Laing, Paul, Sprow, and Strong are back in the office.

(2) Messrs. Randall and Seidel will leave tomorrow noon for Topeka, Kan., to confer Thursday with the Kansas Tax Commission on the 1955 assessment of NGPL. They will be back in the office Friday.

(3) STATION 202 - Herscher Booster
Operation normal - no interruptions
SVG Engine - Suction pressure 1.2 psi. Discharge pressure 711 psi.
Water rate 19,000 gallons. Gas throughput 2.6 MMCF.
JVG Engine - Suction pressure 700 psi. Discharge pressure 711 psi.
Gas throughput 1.8 MMCF.
Desulfurization plant - operation normal. No interrupt'
throughput 4.4 MMCF.

Twenty-six active vil'
Volume of vent gas 5"

(4) DISPATCHER'S REPORT - May 23

	NATURAL
Estimated delivery MMCF	510 1" 496
Weather conditions	Rai'

(5) HERSCHER DRILLING REPO
Karcher #9 cut at
recovery. Dicks
recovery

Is Joe out of town today . . .? What's the weather forecast . . .?

Don't bother to ask. It's all there on your desk, proving . . .

DAILY BULLETIN AIDS *COMMUNICATIONS*

An item in the company bulletin causes M. J. Paul, chief engineer of NGPL and TING, to phone an executive who is leaving the office for several days.

By R. H. LEWIS, Superintendent Employe Relations
Natural Gas Pipeline Company of America
Texas-Illinois Natural Gas Pipeline Company

HAVE YOU EVER SAID:

• "I can't move until he gets back to the office and approves it," or

• "Nuts" after walking that "half a city block" only to find it was your fellow executive's secretary who was catching up on her telephoning? Her boss was at a convention you didn't know he was going to attend.

Such remarks are not as common today in the Chicago home office of the Natural Gas Pipeline Company of America and Texas Illinois Natural Gas Pipeline Company (affiliated companies) as they were two years ago. If such a statement is made today the man making it realizes he, himself, is chiefly responsible, because he has had advance notice that his fellow executive is scheduled to be out of the office. The notice was published in a daily bulletin, which is distributed during the lunch period to the desks of all supervisors.

With construction activities, operating matters, or hearings in Washington necessitating a certain amount of travel, it was not uncommon for a supervisor or officer to be out of the office without prior knowledge by men who need his approval, his signature or discussion with him before they act. Such circumstances obviously created a problem.

Much has been written and spoken about the responsibility of management to keep employes informed. Management has been reminded to keep the channels open for the up-

Field forces are always within earshot with Bell System mobile facilities

You get the most efficient use of company vehicles when you can reach your maintenance crews by telephone at any time. The Bell System offers several types of Mobile Radio arrangements.

General Service: Your fleet can be reached from any telephone. Also, your field forces can call any telephone reached by the Bell System.

Dispatching Service: Your dispatcher can talk to any units in your fleet.

Signaling Service: Your maintenance crews can be signaled over this one-way service and carry out any prearranged instructions, such as calling your office from a public telephone.

Private Mobile Systems: Radio equipment will be provided and maintained for eligible radio licensees. You get the advantages of Bell System engineering, installation and maintenance experience.

Mobile communications can be engineered to meet your specific requirements. For a free survey of your needs, simply call your Bell Telephone representative.

BELL
TELEPHONE
SYSTEM

TELEPHONE TELETYPEWRITER MOBILE RADIO
TELEMETERING AND REMOTE CONTROL CHANNELS

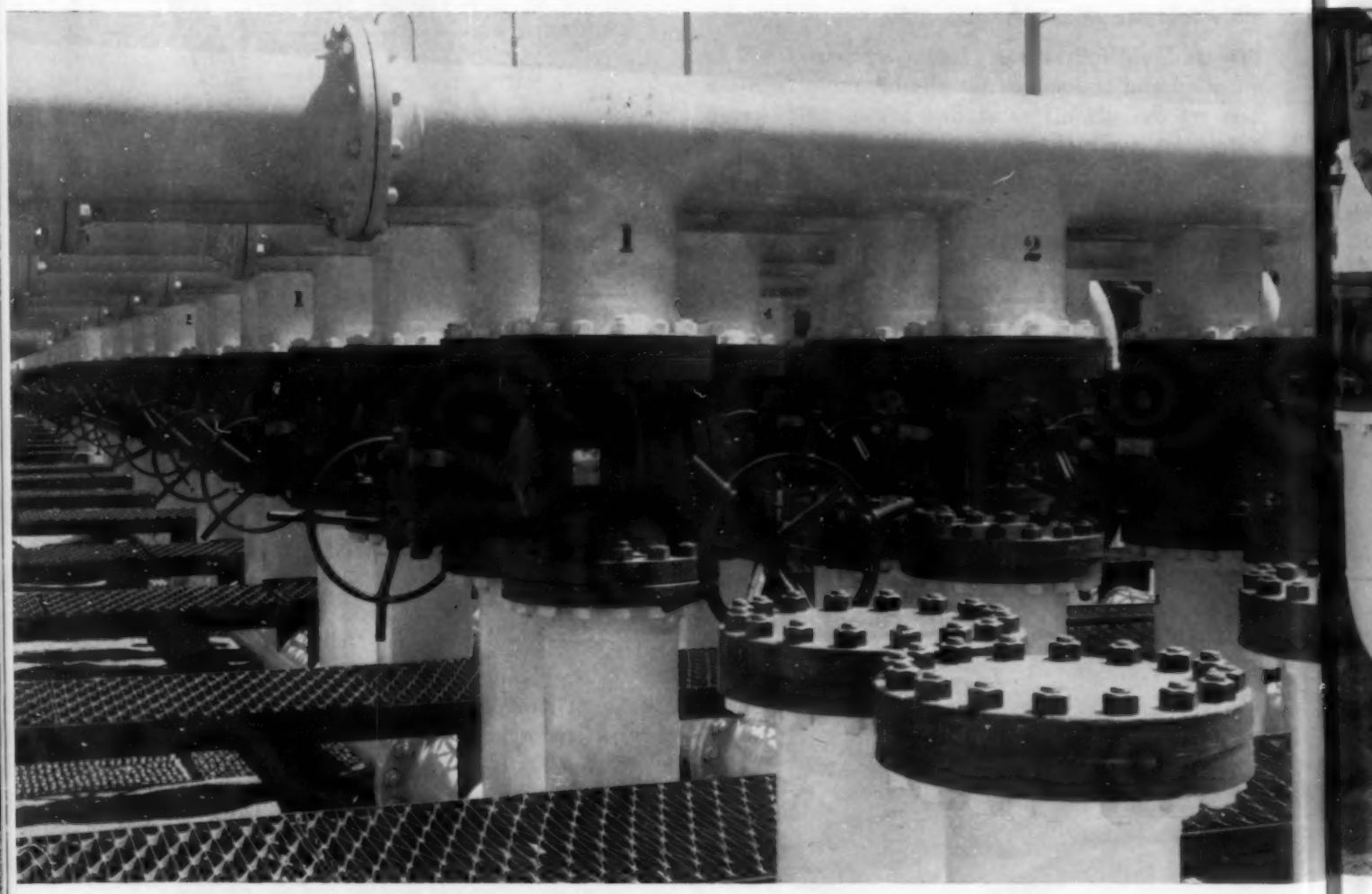
For more data on advertised products, use Readers' Service Cards, last page.

All along the

Costs down....efficiency up....with

There are three good reasons why you'll see Rockwell-Nordstrom valves all along most gas, petroleum or products pipe lines. *One:* pressurized lubricant sealing assures leakproof operation for the lightest hydrocarbons or heaviest fluids. *Two:* quarter-turn operation allows easy, positive control . . . ideal for remote power operation. *Three:* costly metal-to-metal friction on the working parts is eliminated by the tough, protective lubricant film . . . repair and replacement costs are slashed.

Valves represent one of the most important investments in any pipe line operation. All over the world, pipe line companies have found that investing in



These Rockwell-Nordstrom gear operated valves provide fast, positive, dependable control at this huge products terminal.

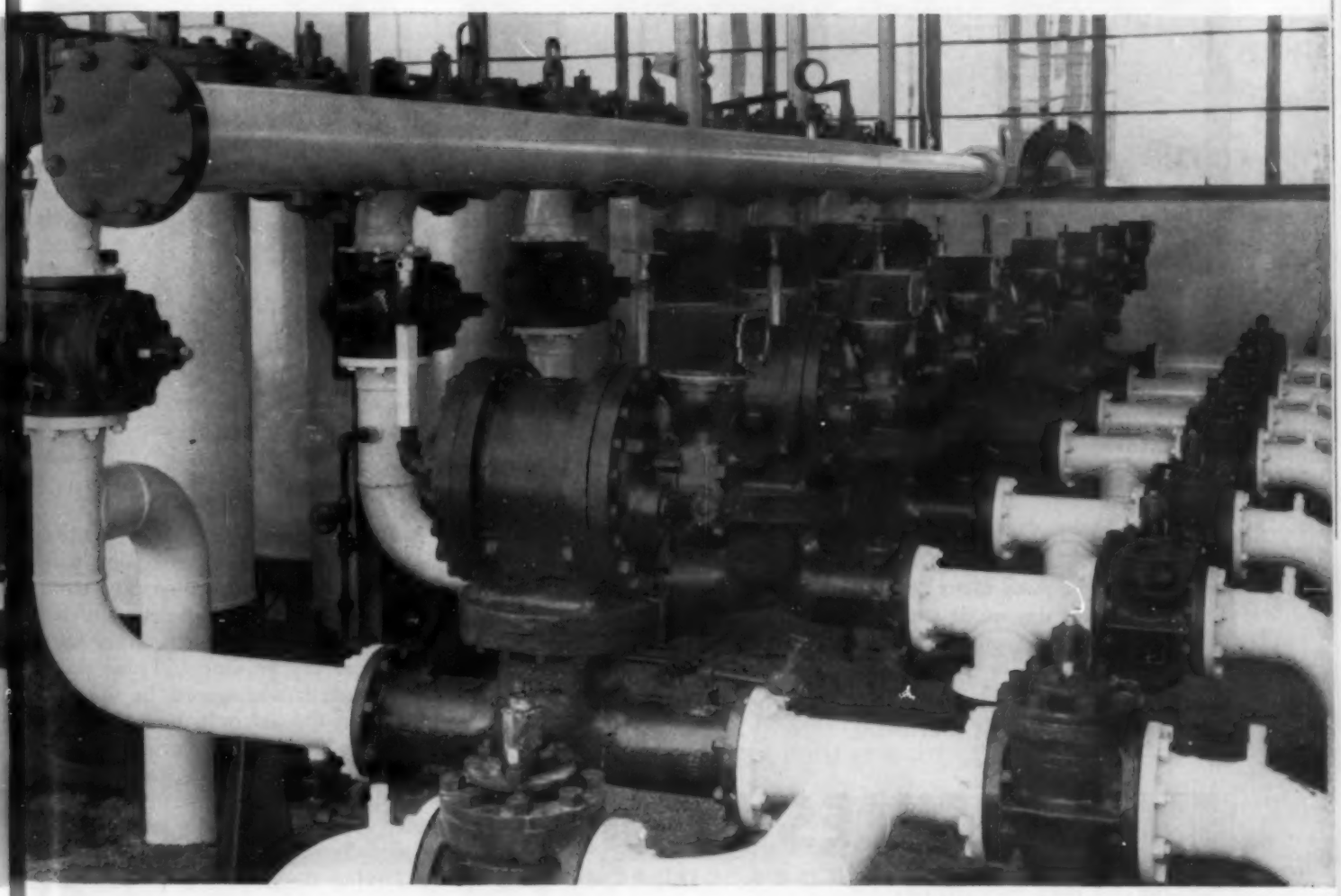
line

Rockwell-Nordstrom Valves

Rockwell-Nordstrom valves pays big dividends in greater dependability, and lower operating costs year after year.

Only with Rockwell-Nordstrom do you get a *complete* range of pressure ratings and sizes based on 40 years of lubricated plug valve leadership. Whatever your pipe line valve requirements, there is the exact Rockwell-Nordstrom valve, lubricant and operating accessory to do the job better, more dependably and at lower cost than any other valve you've ever used. Write for complete details today: Rockwell Manufacturing Company, Pittsburgh 8, Pa.

Canadian Valve Licensee: Peacock Brothers Limited.



Rockwell Rotocycle meters and wrench operated Rockwell-Nordstrom valves make the ideal combination for accurate measurement and dependable control at this products pipe line station.

ROCKWELL-Nordstrom VALVES

LUBRICANT SEALED FOR POSITIVE SHUT-OFF

15 years YOUNG

(Yet to have a major overhaul)

and still going strong!

Yes, 15 years of operation without a major overhaul. That's the kind of service this Hercules Power Unit, Model OOC has delivered on a pump in downtown Kilgore, Texas.

A few years back, a set of rings were installed and the valves were ground, but that's all the service this unit has required — outside of the usual periodical maintenance.

Quite a record, isn't it? This is just another example of the long life and trouble-free operation built into Hercules Engines. You can count on them to provide years of dependable day-in, day-out service. Ask other Hercules Engine owners — they'll tell you how well their Hercules Engines have performed. Then stop at one of our oil field branches or distributors for some facts and operating figures on a power unit to fit your needs.

HERCULES ENGINES

HERCULES MOTORS CORPORATION

40 Years of Engines for Industry

137 Eleventh Street, S. E. • Canton, Ohio

Getting out the bulletin, Jack Prickett, editor of the company's *Between The Lines*, makes daily contacts with executives. Here, his contact with Superintendent of Operations W. T. Bulla has given him information for a magazine article.

ward flow of information. Not quite as much has been said about the need for members of management to keep each other informed. Lateral communications have been taken for granted in too many companies.

In Natural Gas Pipeline Company of America and Texas Illinois Natural Gas Pipeline Company, the vice president of operations, M. V. Burlingame, recognized the problem and prescribed a remedy to the Employe and Public Relations Division. He had seen a daily bulletin published in the Omaha office of Northern Natural Gas Company. With the E & P R staff he discussed possible variations which could be tailored to fit the specific need of the companies. This discussion led to the establishment of one of the most practical publications in the field of written communications. The publication was blessed with that ingredient vital for success in most undertakings—top management backing.

Bulletin's purpose. Prior to publication, specific purposes of the bulletin had to be determined. The most obvious purpose was that the bulletin should announce forthcoming absences of key personnel. Titles alone could not, it was agreed, be the sole factor in the determination of whose absences should be reported. Activities, regardless of names, can be news worthy. Thus the names of some employes not in supervisory positions occasionally appear in the bulletin.

During the discussion of purposes, the opportunity for byproducts became apparent. Few executives have time to read in detail all the news

For more data on advertised products, use Readers' Service Cards, last page.

The CLAIM MAN
an Important Member of the .... SERVICE TEAM

The proper and prompt handling of your Workmen's Compensation claims helps conserve skilled manpower, improves employee relations, and lowers accident costs. The TEIA Claim Man is a specialist trained to render such service.

Put the TEIA Claim Man and the SERVICE TEAM, of which he is a member, to work for you . . . to improve your Workmen's Compensation service and SAVE you money.

Millions of Dollars saved policyholders by Texas largest writer of Workmen's Compensation.

HOMER R. MITCHELL, *Chairman of the Board* A. F. ALLEN, *President*

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TEXAS EMPLOYERS INSURANCE ASSOCIATION
HOME OFFICE - DALLAS, TEXAS

For more data on advertised products, use Readers' Service Cards, last page.

Something New Again

in the LUFKIN LINE – Model TOF (C)

a combination self-loading float and pipe trailer ...

FOR OILFIELD, MACHINERY & HEAVY HAULING TRUCKERS

Get TWO (2) LUFKIN Trailers for little more than the price of ONE (1)

LUFKIN STANDARD MODEL TOF SHOWN WITH ALL OILFIELD SELF-LOADING FEATURES—READY TO BE USED FOR ANY HEAVY DUTY HAULING WHEN FLOAT IS REQUIRED. NOTE—LANDING GEAR FOLDS COMPLETELY UNDER TRAILER AND DOES NOT INTERFERE WITH LOADING OPERATION.

NOSE OF TRAILER IS TILTED FORWARD—BALANCED ON LANDING GEAR—4 PINS ARE REMOVED AND RUNNING GEAR EASILY PULLED BACK BY 1 MAN.

PIPE TRAILER IS COMPLETELY DETACHED FROM FLOAT BED AND READY FOR BOLSTERS, COUPLING POLES, ETC., FOR PIPE HAULING OPERATION.

BOLSTERS AND POLES INSTALLED ON PIPE TRAILER IN A FEW MINUTES.

NOTE: FOUR (4) STEPS ARE REVERSED IN SHORT ORDER TO RE-CONVERT TO FLOAT TRAILER.

HERE ARE THE ADVANTAGES OF THE LUFKIN MODEL TOF (C)

1. **IT'S SAFE—IT'S CONVENIENT**
2. **IT'S CHEAPER—TWO (2) TRAILERS FOR PRACTICALLY THE PRICE OF ONE (1)**
3. **IT'S AVAILABLE—AS A FLOAT OR PIPE HAULER—(2 MEN CAN MAKE CHANGE-OVER IN APPROXIMATELY 30 MINUTES**
4. **ONLY EIGHT (8) TIRES ARE PURCHASED AND MAINTAINED AS AGAINST SIXTEEN (16) WHEN 2 COMPLETE TRAILERS ARE PURCHASED.**
5. **ONLY ONE INSURANCE POLICY IS REQUIRED—IT'S STILL CHEAPER.**
6. **ONLY ONE (1) LICENSE PLATE IS REQUIRED—IT'S STILL CHEAPER.**

You can't GO WRONG with the LUFKIN TOF (C) if you want economy, less maintenance, lower cost and more service.

CALL YOUR NEAREST LUFKIN MAN FOR COMPLETE DETAILS

LUFKIN TRAILERS

DIVISION OF **LUFKIN FOUNDRY & MACHINE CO.**

FACTORY: LUFKIN, TEXAS • Phone 3-4425

BRANCHES AND SALES OFFICES { HOUSTON • DALLAS • ODESSA • SWEETWATER • WACO
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items directed to their attention. Therefore, it was agreed that news affecting the companies or the industry would be published in capsule form or as excerpts. Various business publications are among the sources of such news.

At this point it became apparent that the companies' editorial staff should publish the bulletin.

With the purposes established, the editor of the companies' publications set the wheels in motion. Because about three hours must be devoted daily to the publication of the bulletin, the editor limits his attention to the executive offices. An assistant calls upon superintendents throughout the office, who have been advised by top management that they must contribute to the bulletin if they are to benefit from it.

Additional purposes were added shortly after the first publication:

- During construction, brief progress reports are published.
- In the upper right hand corner of page one (the bulletin is one to three pages in length) the "bid" and "asked" prices of TING stock are listed.
- To eliminate numerous phone calls to the weather bureau or the Dispatching Department the weather forecast is printed daily at the end of the bulletin, with a five day forecast printed on Tuesday and Friday.

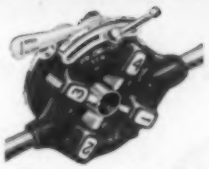
The editor and his staff have uncovered valuable leads to stories and articles for the companies' magazine, *Between the Lines.*

The benefits. Companies interested in establishing such a program should consider several basic questions:

- Is there a real need for such a program?
- Will management have sufficient interest to assure success?
- Is your company staffed to carry out such a program? (For an office of 400 people, about three hours daily must be devoted to such a bulletin. This includes mimeographing and distribution.)

Is is worth it? The companies have a better informed supervisory group than ever before. The individuals in this better informed group have a broader appreciation of their fellow supervisors' problems and activities. They think the effort is worthwhile.

—The End



No. 504... easy to set-up... fast to use . . . precision made... gives perfect threads every time.

No. 4P geared die stock gives perfect threads on 2½" to 4" pipe with four sets (5 each) of dies.

No. 65R for perfect threading by hand or with power ... for use on 1" to 2" pipe ... jam-proof ... kicks out automatically when standard length thread is cut.

Small Ratchet threaders capacity from ⅛"-2".

RIGID
PIPE THREADERS

Today, the craftsman is demanding more from the tools he uses. He buys tools based on performance... accuracy... dependability... and long service life. That's why RIGID Tools are number *ONE* in demand. They are designed and produced by men who have experience ... who have devoted their lives to the manufacture of the finest line of pipe tools available.

SPECIFY THE RIGID "502" ...
for use on any power drive. Single set of self-contained dies adjusts quickly to ½" and ¾" pipe ...regardless of position of quick opening lever.

SPECIFY THE RIGID "504" ...
for use on any power drive. One set of full width dies adjusts to 1", 1¼", 1½" or 2". Quick-opening dies retract immediately while power drive is operating ... eliminates slow back-off. Four-jaw work-holder sets to size instantly ... no lead screw jam.

RIGID
WORK-SAVER PIPE TOOLS

MANUFACTURED BY THE RIDGE TOOL COMPANY • 539 Clark Street, Elyria, Ohio

Discuss your DESALTING problems with an EXPERT

Trained, experienced engineers from Humble's Technical Service Division are at your service. A letter, telegram or telephone call will bring one of them to your refinery for a study of your desalting problem and a specific recommendation for its solution.

Humble's Breaxit Desalting Chemicals are outstanding . . . the result of years of specialized study and experimentation by a company that has problems similar to your own.

Specifically, Breaxit Desalting Chemicals:

Help you get maximum refinery runs . . .
Save you money by increasing output and efficiency . . .
Extend equipment life . . .
Make for safer operation.

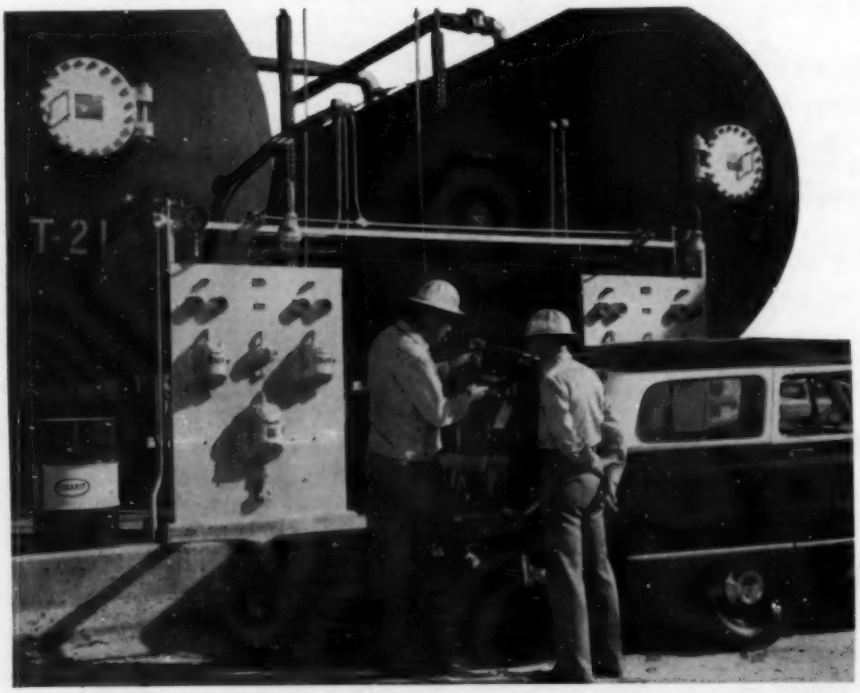
Breaxit

DESALTING CHEMICALS

Manufactured and sold by:

HUMBLE OIL & REFINING COMPANY

HUMBLE



Modernizing a Pump Station

Continued from Page 40

pen receiver-recorder receives air signals from the station bypass and station case pressure transmitters. These signals are recorded as a continuous daily record of these two pressures.

A 9 cubic foot per minute air compressor mounted on an 80-gallon (approximately 10 cubic foot) tank furnishes control air. This is powered by a 2-hp 220/440-volt electric motor which starts automatically when the air pressure drops to 50 psi and stops when the pressure reaches 100 psi.

A device removes moisture vapor from the instrument air supply to prevent instrument malfunction. Compressed air is filtered to remove oil vapor which might damage the absorbent in the air drier.

Three vertical panels in the partition wall hold the pressure controller, pressure recorders, flow recorders, electric tank gage and communications equipment. A fourth panel is blank and held for future use.

The center of operation for the station is the control office. The control desk or console is a lucite topped desk containing a graphic layout of the station main piping and equipment in which motors, pumps, and valves are represented by symbols. Each motor and pump symbol contains trouble lights that indicate unit fault conditions. The suction and discharge valve symbols for the main units enclose indicating lights to show the valve position.

Simplicity of operation has been obtained by arranging the console control apparatus in a facsimile of the station layout which also permits the operator to perform all of the required functions rapidly and conveniently.

Semi-automatic. A coordinated system for each main unit combines motor switchgear with the controls for the pump suction and discharge valves when operating in the semi-automatic position.

Manual. In the "hand" position of the selector switch, units may be started only from the switchgear. Also, valves are not interlocked with the motor starting circuit and must be individually operated. If so desired, the main unit can be operated manually. —**The End**

Rules of Thumb

FOR THE PIPELINER'S NOTEBOOK

$15 Per Rule of Thumb

These formulae from the pages of engineers' own notebooks yield rough, but reasonably accurate answers for design, maintenance and supply questions. The Editors will pay $15 for your pet Rule of Thumb. Send your Rule of Thumb to Donald M. Taylor, Editor, PIPE LINE INDUSTRY, P. O. Box 2608, Houston 1.

Miscellaneous

—22—Correct the volume of light liquid fuels from actual temperature to a base of 60° F.

To approximate quickly the volume of gasoline or other light liquid fuel at 60°F. from a known volume at any temperature in the atmospheric range use the formula:

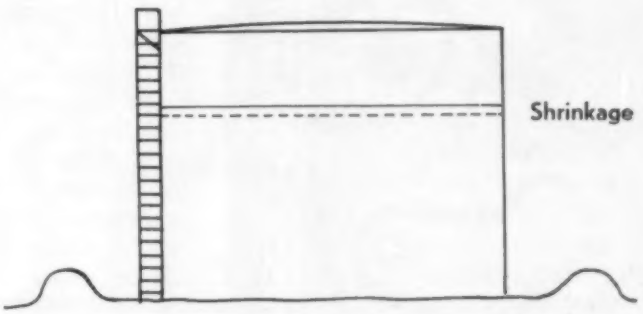
$$V_a - V_{60} = 0.0006\ (T_a - 60)\ V_{60}$$

where V_a = Volume at actual temperature
V_{60} = Volume corrected to 60°F.
T_a = Actual temperature of fuel

Example: A tank contains 5500 gallons of gasoline at 46°F. Correct the volume to a base of 60°F.

$$(5500 - V_{60}) = 0.0006\ (46 - 60)\ V_{60}$$
$$(5500 - V_{60}) = 0.0006\ (-14)\ V_{60}$$
$$5500 = V_{60} - 0.0084V_{60}$$
$$5500 = 0.9916V_{60}$$

Volume at 60°F. = 5546.6 gallons



To approximate the shrinkage or expansion obtain the difference between the actual volume measured and the corrected volume. In this case:

Shrinkage = 5546.6 — 5500 = 46.6 gallons

Miscellaneous

—23—Estimate the capacity of a pipe line per linear foot using the inside diameter.

To find the volume of a pipe line in gallons per foot square the inside diameter in inches and multiply by 4 percent. A more accurate answer may be obtained by adding 2 percent of this result to the first answer.

Example: Find the volume of a pipe line having an ID of 7.981 inch expressed in gallons per foot.

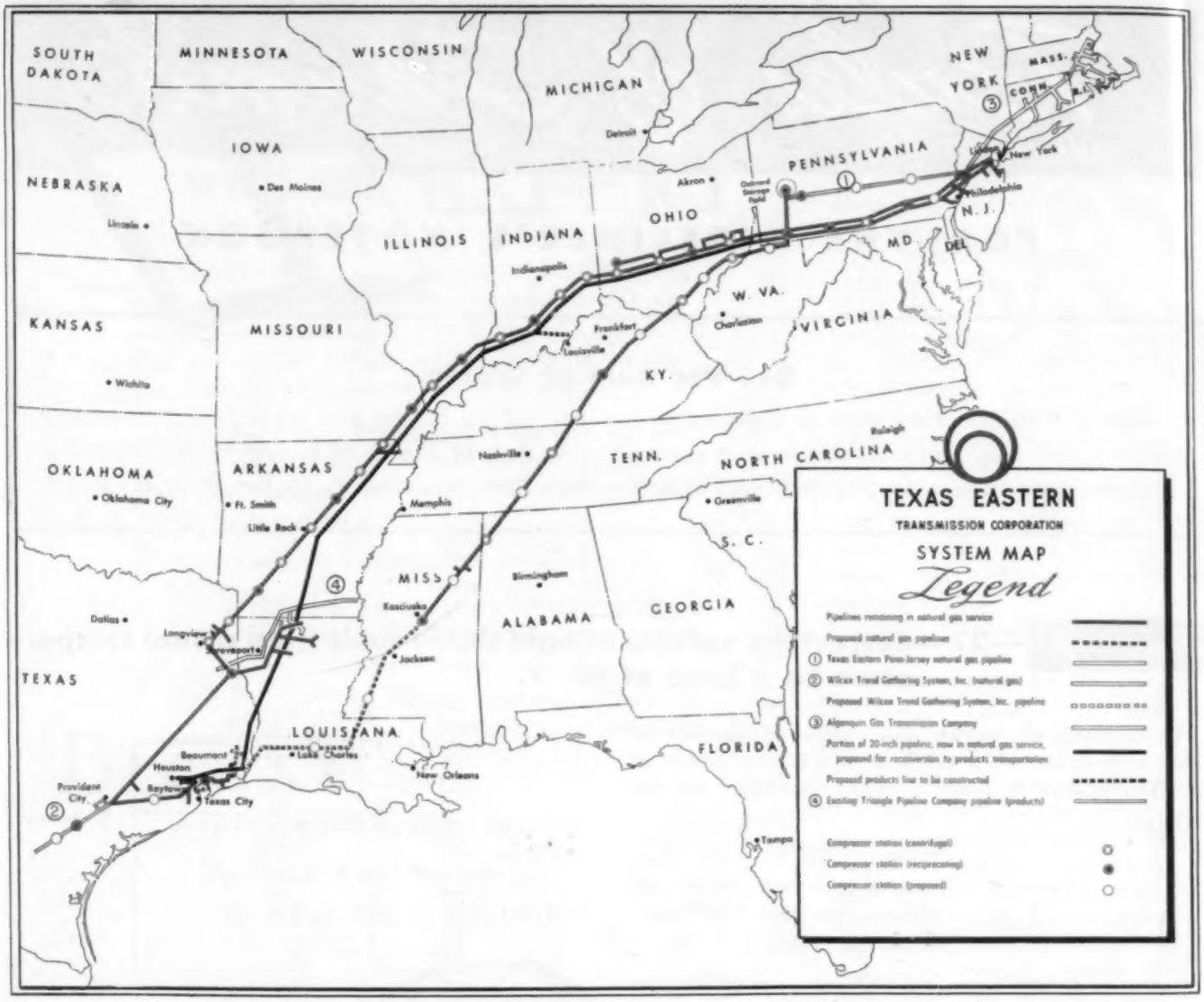
Volume = (0.04) x $(7.981)^2$ = 2.548 gallons per foot
For greater accuracy add 2 percent of 2.548.
2.548 + 0.051 = 2.599 gallons per foot.
Actual volume = 2.599 gallons per foot.

To find the volume of the pipe line in barrels per foot, square the inside diameter in inches and divide by 1000. For greater accuracy substract 3 percent of this value from the first answer.

Example: Find the volume of a pipe line with an I.D. of 7.981 inches in barrels per foot.

$$\text{Volume} = \frac{(7.981)^2}{1000} = 0.0637 \text{ barrels per foot.}$$

For greater accuracy substract 3 percent of 0.0637
0.0637 — 0.0019 = 0.0618 barrels per foot
Actual volume = 0.0619 barrels per foot.



Texas Eastern Begins $86 Million Program

New 30-inch Beaumont-Kosciusko line will free Little Big Inch for return to products service.

By **MELVIN A. JUDAH,** PIPE LINE INDUSTRY Staff

Developments are moving along rapidly on Texas Eastern Transmission Corporation's widespread construction activities. Early in the month, the FPC approved Texas Eastern's request to amend its certificate for the Beaumont, Texas—Kosciusko, Miss., line; authorizing use of 30-inch line instead of the 24-inch previously approved.

Use of the larger pipe and revised engineering design eliminated two compressor stations and decreases the initial cost of the line by about $1 million. The new plans also will cut annual operating service costs by another $350,000, explained Texas Eastern engineers.

Overall costs of the new natural gas line and facilities is estimated at $70,883,000. This includes 377 miles of 30-inch line, eight new compressor stations, 100 miles of laterals and connecting smaller lines, and additional compression horsepower at existing stations. When placed in service, these facilities will increase delivery capacity on the 30-inch Moundsville, W. Va., line by an amount equal to that now being handled by the Little Big Inch—about 200 million cubic feet per day.

Close on the heels of FPC ap-

proval, Texas Eastern announced the awarding of contracts for construction of the line, five river crossings and the compressor stations. Brown & Root, Inc. will furnish field supervision for the project and construct the stations. Contracts were awarded for six sections of line and five dual river crossings:

Section 1. 59 miles from Beaumont, Texas, to DeQuincy, La.; Houston Contracting Company of Houston, Texas.

Section 2. 63 miles from DeQuincy to Opelousas, La.; Tulsa Williams Company of Tulsa.

Section 3. 55 miles from Opelousas to New Roads, La.; Tulsa William Company.

Section 4. 65 miles from the east side of the Mississippi river near New Roads to Bude, Miss.; H. C. Price Company of Bartlesville, Okla.

Section 5. 69 miles from Bude to Clinton, Miss.; H. C.. Price Company.

Section 6. 65 miles from Clinton to Kosciusko, Miss.; H. B. Zachry Company of San Antonio.

Dual river crossings will be made by the following contractors:

Neches River—Pentzien, Inc. of Omaha.

Sabine River—Missouri Valley Dredging Company of Omaha.

Atchafalaya River — Pentzien, Inc.

Mississippi River—J. Ray McDermott Company of Harvey, La.

Bayou Courtableau — Missouri Valley Dredging Company.

Addition of 127,420 horsepower will boost total compression on the Beaumont-Moundsville line to 181,220 when construction work is completed. Eight new stations will be built:

Gas Engine Reciprocating	
Booth, Texas	2200 hp
Vidor, Texas	5000 hp
Holbrook, Pennsylvania	8800 hp
Electric Motor Driven Centrifugal	
Egypt, Mississippi	15,000 hp
Mt. Pleasant, Tennessee	15,000 hp
Tompkinsville, Kentucky	15,000 hp
Gas Turbine Centrifugal	
Owingsville, Kentucky	15,200 hp
Athens, Ohio	15,200 hp

An additional 36,020 horsepower will be installed at existing stations:

Gas Engine Reciprocating	
Kosciusko, Mississippi	5000 hp
Danville, Kentucky	3520 hp
Electric Motor Driven Centrifugal	
Barton, Alabama	7500 hp
Gladeville, Tennessee	7500 hp
Wheelersburg, Ohio	7500 hp
Berne, Ohio	5000 hp

Soon after construction got underway on the new line, Texas Eastern announced FPC approval of two additions on affiliated lines. Texas Eastern-Penn Jersey Transmission Corporation will shift 10,000 horsepower from the Texas Eastern to Texas Eastern-Penn Jersey system. Shifts will be made at Phoenixville, Chambersburg and Wind Ridge, Penn. Penn-Jersey will add 5000 horsepower at Perulack and at Grantville, Penn. Texas Eastern will add 3300 horsepower at its Linden, N. J., station. Eleven miles of loop lines will be laid in the Philadelphia area. Over-all cost of the project is estimated at $5,433,400 for the two companies.

At the other end of its system, Texas Eastern's subsidiary, Wilcox Trend Gathering System, Inc., received FPC authorization to construct a new 2000 horsepower station near Charco, Texas, and to add 2200 horsepower at its Thomaston, Texas, station. A 16-mile loop of 16-inch will be laid near Provident City, Texas. The additional facilities will boost Wilcox's delivery capacity to about 200,000 Mcf per day. Estimated cost of the project is $2.9 million.

Cities Service Asks OK For Kansas, Oklahoma Lines

Cities Service Gas Company has applied to the FPC for authority to construct a total of 238 miles of pipe line and a new 2700 horsepower compressor station on its system in Kansas and Oklahoma.

The project includes 93 miles of 26-inch line from Kay county, Okla., to Montgomery county, Kansas, and a new 2700 horsepower station in Woods county, Okla. Cities Service would also build 145 miles of gathering and transmission lines in Woods County, Okla., and Barber County, Kansas.

Proposed construction will cost an estimated $8,422,000 and increase the daily capacity of the Cities Service system by 50 million cubic feet per day in 1955 and up to 100 million cubic feet later.

TOWER'S PACKAGE
LIGHTS your lamp
From the specially planned steel or concrete building to the beacon light on top, you're assured of the right installation . . . with speed and efficiency that saves you money.
TOWER'S SERVICE
KEEPS it lit!
Getting you "on-the-air" is important . . . but keeping you operating is of even greater importance. TOWER'S specialized maintenance service keeps "dead air" to a minimum. Call on TOWER to solve your tower problems.
Tower Fabricators and Erectors The World Over
TOWER
CONSTRUCTION COMPANY
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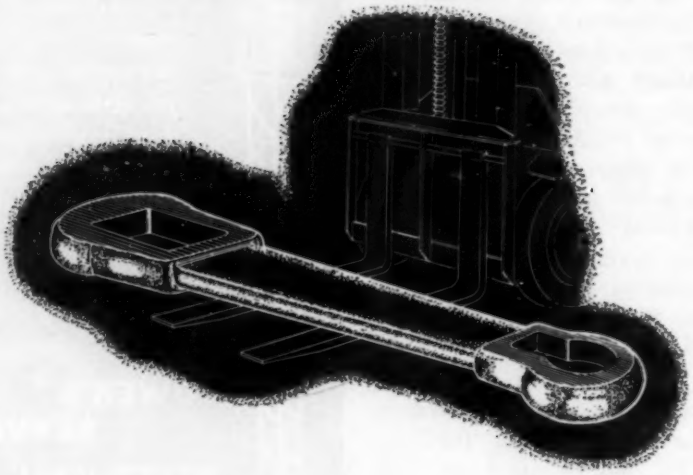
Worn?
Mismachined?



VANDERLOY*
is the answer.

Connecting rods, power cylinders, shafts, rods—i.d. or o.d. surfaces—all can be restored to design dimensions by the application of VANDERLOY.

VANDERLOY* **an electrolytic iron that bonds atomically with most ferrous metals, aluminum, copper, nickel and their alloys.**

Write for additional information on this NEW reclamation service.
Dept. PL-2, VAN DER HORST CORPORATION, Olean, N. Y.

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Pacific Northwest Lets Second Round of Contracts

Pacific Northwest Pipeline Corporation has let contracts for 509 miles of main line and laterals, plus 47 miles of gathering lines in the second step of pushing its 1466-mile line from the San Juan Basin to the Pacific Northwest. Contracts awarded to four contractors totaled $7,065,000.

The four main line sections awarded run from Burley, Idaho, to the Columbia river Washington-Oregon state line. Together they make up 412 miles of 22-inch line. In addition, 97 miles of 10¾-inch and 16-inch laterals to the Big Piney field and the Piceance Creek field and 47 miles of gathering lines were awarded.

Contractors named in the second round are:

Sections 9 and 10. H. B. Zachry Company, San Antonio; 214 miles of 22-inch from Burley to Payette, Idaho.

Sections 11 and 12. Fulghum Construction Company, Harrisburg, Penn.; 198 miles of 22-inch from Payette to the Columbia river.

Section 26. A. J. Curtis Construction Company, Casper, Wyo.; 54 miles of 16-inch lateral and 31 miles of gathering system line from main line near Kemmerer, Wyo., to Big Piney field.

Section 27. R. H. Fulton & Company, Lubbock, Texas; 43 miles of 10¾-inch and 16 miles of gathering system lines from Rangely, Colo., to Piceance Creek field.

Contracts have now been let for 1067 miles of Pacific Northwest's 1466-mile main line.

Texas Gas Transmission Plans $20 Million Project

Texas Gas Transmission Corporation has filed an application with the FPC for construction of 198 miles of pipe line and the addition of 20,270 horsepower in compressor capacity on its system in Louisiana, Arkansas, Mississippi, Tennessee, Kentucky and Indiana.

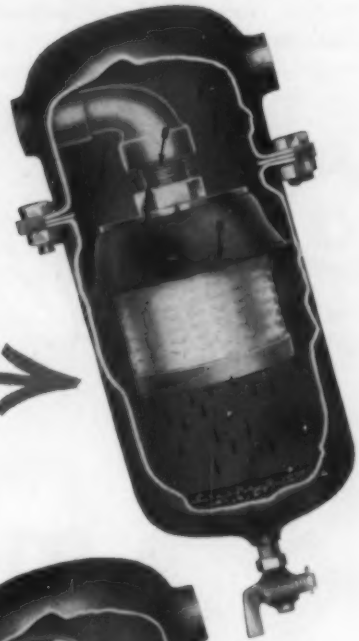
The project will make available an additional 35 million cubic feet of natural gas per day to Ohio Fuel Gas Company, and 73,598 Mcf per day to other customers of Texas Gas. Estimated cost of the new facilities is $19,969,000.

STAYNEW FILTERS' DOUBLE ACTION

Guards Against Water, Oil and Pipe Scale

MECHANICAL SEPARATION

1. Deflector cup directs flow of air or gas together with water, oil and dirt to the walls of the housing and then downward at high velocity into the base where liquid and heavier dirt particles are deposited.



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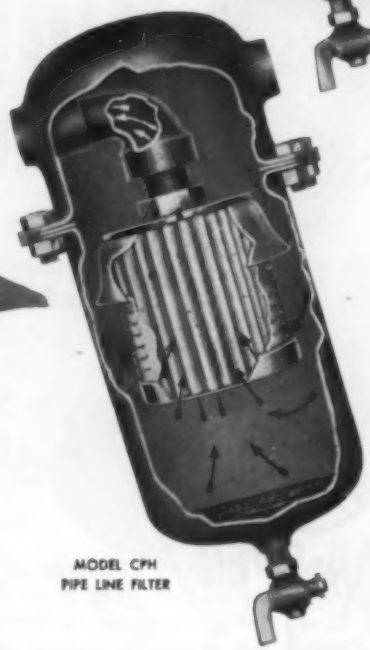
2. Air or gas, having been mechanically cleaned, rises at low velocity through the Radial Finned Filtering element or insert which removes the lighter air-borne material.



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PIPE LINE FILTER

This exclusive Double-Action principle of Staynew Pipe Line Filters assures sustained, trouble-free operation. Inexpensive, quickly installed and easily maintained, these filters keep air operated or controlled equipment free from pipe scale, dust, dirt, and condensate. Wherever you require air and other gases *clean* and *dry*—demand and get—Staynew Pipe Line Filters.

Write today for complete Staynew Pipe Line Filter Bulletin B-1A.

Representatives in Principal Cities

DOLLINGER MFG. PROTECTOMOTOR REG. U.S. PAT. OFF. STAYNEW FILTERS

DOLLINGER

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ALL TYPES OF FILTERS FOR EVERY INDUSTRIAL NEED

For more data on advertised products, use Readers' Service Cards, last page.

American-Louisiana Begins Louisiana to Detroit Line

Another major gas pipe line project is underway with start of construction on American Louisiana Pipe Line Company's 30-inch line from Lowry, La., to Detroit. Three contractors have been awarded jobs for construction schedules this year and early in 1956.

Houston Contracting Company and H. C. Price Company are joint contractors on the northern 783-mile section from the Arkansas-Louisiana state line near Eudora, Ark., to Willow Run, Mich. Houston Contracting will use two spreads this year on the 215-mile section from Willow Run to Newcastle, Ind.

Two H. C. Price spreads will start construction soon on the 185-mile section between Newcastle and Slaughters, Ky. Schedule calls for completion of 400 miles of 30-inch line in the joint project this year. In early 1956, H. C. Price and Houston Contracting will finish the remaining 383 miles from Slaughters to Eudora.

Brown and Root has been awarded the contract for the 269-mile section in Louisiana. Included in this job will be 196 miles of 30-inch from Eudora to Tepetate, La., 35 miles of 26-inch from Tepetate to Lowry; and 38 miles of 16-inch from Lowry to Cameron, La. Brown and Root will also design and construct compressor stations totalling 310,000 horsepower.

J. Ray McDermott is making the Mississippi river crossing near Greenville, Miss. Dredging operations are already underway.

Only one section of line has not been contracted, a 117-mile 22-inch spur from Payne, Ind. to Bridgman, Mich.

Pasotex to Use 20-Inch On West Texas Crude Line

Pasotex Pipe Line Company will soon begin construction of a 20-inch pipe line on its 195-mile Wink to El Paso system. The first phase will be substitution of 70 miles of 20-inch pipe for two 8-inch parallels. The initial project will increase deliveries of crude to El Paso by 10,000 to 55,000 barrels per day.

T. S. Petersen, president of Standard Oil Company of California, announced that the expansion permits an ultimate delivery capacity of 220,000 barrels of crude oil per day to El Paso.

Petersen also explained that in an emergency, the extra capacity of an enlarged Pasotex line could be made available to Southern Pacific Pipe Lines for shipment to California.

Pacific Gas and Electric Seeks Super-Inch Loop

Pacific Gas and Electric Company has asked the California Public Utilities Commission for authorization to add a 189.8-mile loop to the existing 502-mile line between Topock, Ariz., and Milpitas, Calif. This loop virtually will complete construction of a second 34-inch line—the original Super-Inch has already been paralleled with 283 miles of line.

The $24 million project would carry on additional 225 million cubic feet of natural gas per day into central and northern California. PG&E could then import up to 925 million cubic feet per day from Texas and New Mexico fields by January, 1959.

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fast Service
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Magnesium anodes...
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We get your anodes to you in record time. Our reputation for taking care of customers in a hurry is one of our biggest assets. You can depend on our consulting and engineering service to solve your anode installation problems.
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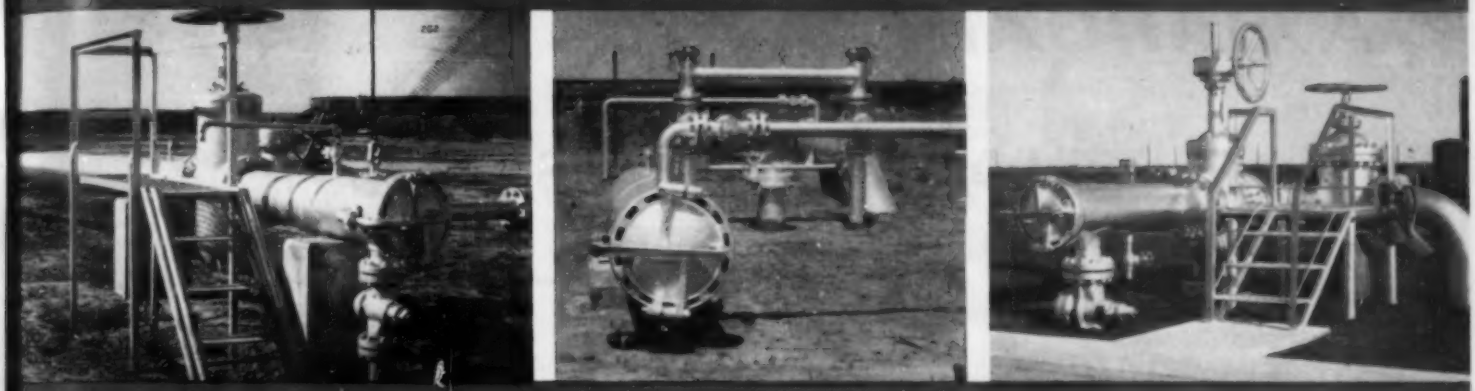
The handiest, safest way to



start and catch a pig....

Unibolt Hinged Scraper Traps

All you need do to open the UNIBOLT Hinged Scraper Trap is release two bolts and the blanking plug swings open like a door. No heavy lifting. Nothing to fall on workmen. No time-consuming blind flanges to make up. No danger of leaks—the UNIBOLT self-sealing oil-resistant gasket, which seldom needs replacement, assures a pressure-tight seal and low maintenance.

Many operators fabricate UNIBOLT Hinged Scraper Trap closures on an oversize barrel in order to facilitate starting the pig. Thus, line pressure does the heavy work.

Wherever multi-bolt flanged couplings and closures are now being used . . . on strainers, scrubbers, mist removers, terminal manifolds, blowdowns or other pressure vessels . . . UNIBOLT Couplings will serve you better.

THORNHILL CRAVER CO.

P. O. BOX 1184 HOUSTON, TEXAS

A ***BARGAIN***

THAT BY-PASSES

THE DISTRIBUTOR

IS NO BARGAIN AT ALL!

In these times of mounting production costs, many purchasers of industrial supplies and materials are beginning to look upon their distributors as an extra expense. At first blush, it might *seem* cheaper to buy direct from the maker.

Actually, the distributor helps *both* the buyer and manufacturer save money. Like this:

He saves the buyer warehousing, handling and storage details, paperwork, provides an immediate single source of supply for thousands of items that industry needs, often in a hurry.

He saves the manufacturer the cost of heavy inventory maintenance in all parts of the country, the expense of an army of salesmen, a fleet of trains and trucks, and a staff of credit and collection experts. In a sense, your distributor represents a cooperative distribution facility that you share with all other firms in your area.

Next time you're tempted to get a direct quotation from the manufacturer, whether on a big or small item, figure out *all* the costs—not just the first cost—and you'll find you gain much more, yet in the long run pay no more, by utilizing the services of your distributor.

WICKWIRE ROPE

3131

A PRODUCT OF THE COLORADO FUEL AND IRON CORPORATION

Southern Pacific Builds River Crossings, Stations

Southern Pacific Pipe Lines, Inc., has started work on three overhead river crossings on its El Paso to Los Angeles products line. Hoffman-Miller, Phoenix consulting engineer, is doing the engineering on the crossings of the San Pedro river near Benson, Ariz., and of the Colorado river at Yuma.

Associated Pipe Line Contractors, Inc., Houston, has been awarded the contract for design and construction of the overhead crossing of the Rio Grande near El Paso.

Contract for construction of the El Paso pumping station has been awarded to Robert M. McKee, Inc., of El Paso and work is now under way. Two centrifugal pumps will be driven by two 300-horsepower electric motors.

Work is under way, too, on the Watson, Calif., pumping station awarded to J. A. McNeil Construction Company of Alhambra, Calif. The station will have three pumps, each driven by a 300-hp electric motor.

Terminal facilities in Phoenix for the new line will be constructed on a 60-acre tract of land recently purchased by the Southern Pacific Company. Tank farms and receiving points will be established for as many as eight shippers, stated company officials.

Anderson-Prichard Forms Products Pipe Line Firm

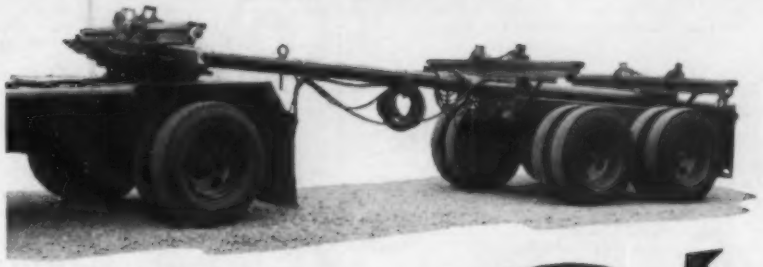
Anderson-Prichard Oil Corporation has organized a wholly-owned products pipe line company, the APCO Pipe Line Company, and is nearing completion of construction on its first line. A 4-inch, $200,000 pipe line will soon carry products from the Anderson-Prichard refinery at Cyril, Okla., to Duncan, Okla.

From a Duncan terminal, products will be tendered to Oklahoma Mississippi River Products Line, Inc., and to Great Lakes Pipe Line Company.

ERRATUM

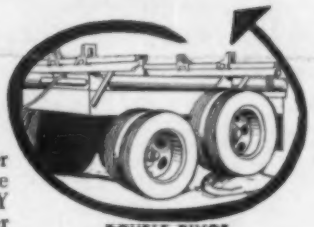
In the article "The Meter of the Future Is Here" by Frank C. Smith, Jr., Page 39, July, 1955, PIPE LINE INDUSTRY, the opening statement under subheading No. 3 should have read "It is unnecessary to record input variables—static pressure, etc. . . ." PLI regrets this error.

TOP QUALITY PIPELINE TRAILER



THE LOADCRAFT

PIPELINER



DOUBLE PIVOT TANDEM PRINCIPLE

At last here's a top-quality tandem trailer for the pipeline industry that is really built to take the cross-country hikes. The axles will STAY in alignment. Quality that has made Spencer Trailers popular with the oil fraternity for over 38 years goes into each of these jobs.

Double pivot tandem keeps load in balance in rough terrain, reduces wear and tear on axles and tires. Hi-tensile pressed steel frame, wood surface block-type bolster plus other exclusive features gives you the kind of trailer you have needed . . and at a price that is less than you would expect to pay for such high quality.

Spencer-Safford LOADCRAFT
AUGUSTA, KANSAS

Please send me information on your
Pipeliner___ Pole Trailer___ Oil Field Float___
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"KICKOFF" . . . for Magnolia Pipeline Company . . . 127 miles of 12 inch, 14 inch, 16 inch . . . 2½ miles laid per day.

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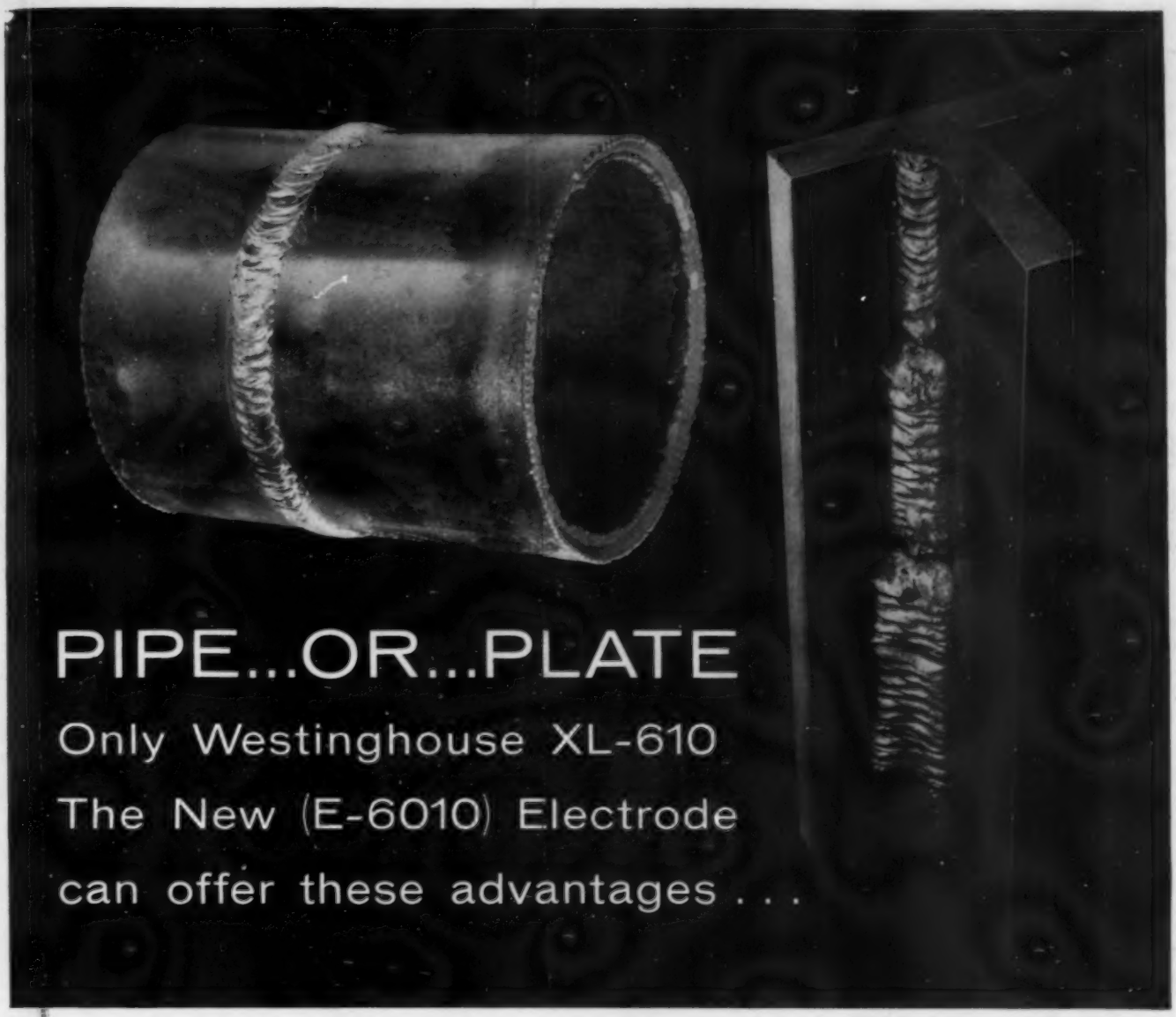
Pipe Line Contracts Not Let

COMPANY	Length in Miles	Diameter	Type	Origin and Terminus	Estimated Cost	Status
Alabama-Tennessee Natural Gas Co.—Florence, Ala.	25	8, 12	Gas	Colbert County, Ala. loop.	$808,450	3.7 miles authorized
American Gilsonite Co.	80	....	Gilsonite Slurry	Bonanza, Utah—Western Colorado, refinery	.....	Planned
American Pipe Line Corp.—New York City (Swinerton & Walberg, Engineering)	1,425 plus 485 miles feeders & distribution lines	24, 26	Products	Beaumont, Texas area—Newark, N.J.	$170 million	Approved ODM
Arkansas-Louisiana Gas Co.	66	24	Gas	Arkansas, Louisiana and Texas loops	$9,245,166	Authorized
Ar-Mex Pipe Line Co.	900	8, 12, 14	Crude	Guernsey, Wyo.—Phoenix, Ariz.	$31 million	Planned
H. W. Bass & Sons, Inc.	152	4, 6	LPG	Live Oak County, Texas—Corpus Christi, Texas	.....	Planned
Bell Oil and Gas Co.	140	6-8	Products	Ardmore—Cushing, Okla.	.....	Planned
Big Horn Pipe Line Co.—Cheyenne, Wyo.	150	8	Crude	Ash Creek, Wyo. field—Midwest, Wyo.	.....	Planned
California-Oregon Pipe Line System	103	6	Crude	Crescent City, Calif.—Medford, Ore.	$2 million	Planned
Carolina Natural Gas Corp.—701 Wilder Bldg., Charlotte, N.C.	185	2, 12	Gas	North and South Carolina	.....	Proposed
Central Hudson Gas & Electric Co.	48	12	Gas	Albany—Kingston, N.Y.	.....	Applied to FPC
Cities Service Gas Co.—1st National Bank Bldg., Oklahoma City, Okla.	33	20, 26	Gas	To replace lines in Kansas and Missouri	$1,860,000	Authorized
	13	....	Gas	Lafayette County, Kansas	$285,000	Authorized
	15.5	16	Gas	Carter County—Garvin County, Okla.	$541,050	Authorized
	93	26	Gas	Blackwell, Okla.—Independence, Kan., plus 145 miles of gathering lines	$8.4 million	Before FPC
Clinchfield Coal Corp.—Dante, Va.	16	12	Gas	Dickenson County, Va.—Osborne Gap, Ky.	$785,000	Authorized
Coastal Transmission Corp.—Houston, Texas	500	30	Gas	McAllen, Texas—Louisiana connection, Houston, Texas Gas.	$110 million	Considered
Coast Counties Gas & Electric Co.—369 Pine St., San Francisco	40	3, 4, 8	Gas	Coast and Valley region, Calif.	.....	Planned
Colorado Interstate Gas Co.	115	4, 6, 8	Gas	Denver—Julesburg Basin—Basin Cities	.....	Before FPC
	328	16, 18	Gas	LaPlata County—Pueblo, Colorado Springs and Denver	$21,600,000	Authorized
Compania del Oleoducto Buenaventura—Cali, Colombia, S.A.	90	....	Products	Buenaventura—Cali, Colombia, S.A.	$4 million	Planned
Consolidated Gathering Systems, Ltd.	198	....	Crude	Sturgeon Field—Edmonton.	.....	Planned
Consolidated Natural Gas Corp.—New York	112	....	Gas	In Ohio—Plus other smaller lines	$6 million	Planned
Deep Rock Gas Co.	120	6	LPG	Tioga, N.D.—Canadian border	.....	Planned
Dixie Pipe Line Co.	20	8	Gas	Gwinville Field, Miss.—Transcontinental Gas line	$425,000	Authorized
El Paso Natural Gas Co.—El Paso, Tex.	32.5	10	Gas	Reagan and Upton counties, Texas	$799,000	Authorized
	370	....	Gas	Mountain Home, Idaho—Reno, Nev.	$35 million	Proposed FPC
	500	34	Gas	Parallel from San Juan Basin to Topock, Ariz.	.....	Proposed FPC Alternate
	....	30	Gas	Pendleton, Ore.—Calif.	.....	Proposed FPC Alternate
	31.9	8	Gas	Pinal County, Ariz. Service Line.	.....	Before FPC
	119	3-6	LPG	Bloomington—Gallup, N.M.	.....	Planned
Empresa Nacional del Petroleo	80	6	Products	Concon—Santiago, Chile	.....	Planned
Governments of Southern Rhodesia and Portuguese South Africa	200	....	Products	Beria, Portuguese Mozambique—Umtalia, Southern Rhodesia	.....	Considered
Great Lakes Pipe Line Co.	106	12	Products	Des Moines—Iowa City Loop	.....	Proposed
Hope Natural Gas Co.—445 W. Main St., Clarksburg, W. Va.	33	8, 10, 12	Gas	Wyoming County, W. Va.—Buchanan County, Va.	.....	Proposed
Houston Texas Gas & Oil Co.—4604 Main St., Houston	1042	18, 24, 36	Gas	Louisiana—Miami, Fla.	$110 million	Considered
Idaho Natural Gas Co.—Goodland, Kansas	....	....	Gas	Pacific Northwest line—points in Southern Idaho	.....	Proposed
International Pipe Line Co., Inc.—227 N. Colfax Ave., Minneapolis, Minn.	132	8	Products	Wrenshall, Minn.—Minneapolis Bulk Terminal	$4,250,000	Planned
Iraq Petroleum Co.	75	24	Crude	Homs, Syria to Tripoli	.....	Proposed
Kentucky-West Virginia Gas Co.	32	12	Gas	Osborne Gap, Ky.-W. Va.—Maytown, Ky.	$1,455,000	Authorized
Lateral Gas Pipe Line Co.—Cedar Rapids, Iowa	27	4	Gas	Grant—Clarinda, Iowa	$267,000	Proposed
Lone Star Gas Co.—Dallas	230	22, 26	Gas	Cotton County, Okla.—Fritch, Texas	$18.7 million	Before FPC
	205	....	Gas	Snyder, Texas to tie in with Cotton County, Okla.—Fritch, Texas line	.....	Before FPC
Malco Pipe Line, Inc.	91	6	Products	Prewitt, N.M.—Albuquerque	$1,250,000	Planned
Manufacturers, Gas, Light, and Heat Co.	72	16-20	Gas	Doddridge, Wetzel, and Marshall Counties, W. Va.	.....	Planned
	213	3-26	Gas	Various locations in Pa., W. Va., and Ohio	.....	Planned
	40	....	Gas	Allegheny, Washington, and Beaver Counties, Pa.	.....	Planned
Mayflower Pipe Line Co.-(Pine Tree Natural Gas Co.) —70 Pine St., New York, N.Y.	200	....	Products	New Jersey refining area—New England	.....	Planned
Michi, Inc.	222	10	Crude	Highland, Ind.—Alma, Mich.	.....	Planned
Michigan-Wisconsin Pipe Line Co.—500 Griswold, Detroit	252	4-24	Gas	Various locations in Illinois and Wisconsin	$11 million	Proposed
Mississippi River Fuel Corp.	190	10-18	Gas	Laterals in Woodlawn and Waskom Gas Fields, Texas	.....	Planned
Missouri Central Gas Co.	25	6	Gas	Moberly—Macon, Mo.	.....	Proposed
Missouri Public Service Co.—Warrensburg, Mo.	136.4	8-10	Gas	New Franklin, Mo.—Grundy County, plus laterals	$5 million	Proposed
Montana-Dakota Utilities Co.—Minneapolis	56	2, 4, 6	Gas	Hettinger and Stark counties, N.D.	$728,854	Authorized
	30	16	Gas	Service lines and compressor facilities at various locations	$1.9 million	Before FPC
	110	....	Gas	Tioga to Minot and Williston, N.D.	$5 million	Planned
	44	....	Gas	Various locations in S.D. and Wyoming	$1,414,200	Before FPC
Moore-Stoner Co.	200	6	Products	Glendive, Mont.—Minot, N.D.	$2.5 million	Planned
NATO	1920	4-10	Products	To serve military bases in Western Europe	.....	Foster-Wheeler Prime Contractors
Natural Gas Pipe Line Co. of America—20 N. Wacker Dr., Chicago	350	20, 26	Gas	Wise County, Texas—Fritch, Texas	$28.5 million	Before FPC
Natural Gas Producers, Inc.—Colorado Springs	61.8	12	Gas	Yenter Pool—Denver	$1,374,000	Planned
	49	10	Gas	Denver-Julesburg Basin—Fort Morgan, Brush and Denver	.....	Planned
Natural Gas Storage Co. of Illinois—Chicago	35	36	Gas	Delivery from Herscher, Ill. storage field.	$7 million	Before FPC
Nebraska Pipe Line Co.	220	6	Products	Cheyenne, Wyo.—North Platte, Neb.	$4 million	ODM certificate granted
Nevada Natural Gas Co.	114	12, 16	Gas	Various loops along Needles, Calif.-Las Vegas, Nev. line	$2.5 million	Planned
New River Gas Co.	50	....	Gas	Summers-Monroe Counties, W. Va. and Narrows and Dublin, W. Va.	.....	Planned
NNCW Pipe Line Co.—Dallas, Texas	127	8, 10	Crude	Clareton Field—Casper, Wyo.	$3.6 million	Planned
Northern Natural Gas Co.—2223 Dodge St., Omaha	167	24	Gas	Farmington, Minn. to Duluth, Minn. and Superior, Wis.	$12 million	Before FPC
	329	2, 12	Gas	Sioux Falls to Aberdeen. S.D.	$6,661,100	Proposed
	....	....	Gas	To interconnect with Natural Gas Pipe Line	$244,000	Planned
	403	24, 30	Gas	Emerson, Manitoba, Canada—Farmington, Minn.	$32,813,000	Before FPC
	28.4	30	Gas	Test lines to underground storage near Redfield, Iowa	$4.8 million	Before FPC
Northwestern Utilities, Ltd.—10124-104th St., Edmonton, Alberta, Canada	42	12	Gas	Bonnie Glen—Edmonton, Alberta	$1.4 million	Proposed
Ohio Fuel Gas Co.	18.9	16	Gas	Hardin and Allen Counties, Ohio	.....	Before FPC
Pacific Gas & Electric Co.	190	34	Gas	Various loops, between Topock, Ariz.—Milpitas, Calif.	$4 million	Proposed
Pacific Northwest Pipe Line Corp.—M & M Bldg., Houston	1466 plus 443	22, 26	Gas	San Juan Basin—Pacific Northwestern states	$163 million	Contracts let for 1221 miles
Panhandle Eastern Pipe Line Co.	58	16	Gas	Springfield—Peoria—Illinois Loop	.....	Before FPC
Pawnee Pipe Line Co.	15	8	Crude	Northeast Colorado Sector—Denver-Julesburg, Basin	.....	Planned
Permian Basin Pipe Line Co.	11	6	Gas	Lea County, N.M.	.....	Before FPC
Petroargentina	370	16	Crude	Newguen—Bahia Blanca, Argentina	$40 million	Planned
Petroleos Mexicanos—Ave. Juarez, 94, Mexico City	440	20	Gas	Brazil—Tampico—Poza Rica, Mexico	.....	Planned
	260	6, 8	Products	Lagos, Mexico—Guadalajara, Aguascalientes and Salamanca	.....	Planned
	145	12	Crude	18 de Marzo Field—Monterrey, Mexico	.....	Considered
	72	12	Crude	Poza Rica—Atzacapotzalco, Mexico	.....	Proposed
Phillips Petroleum Co.—Bartlesville	54	6	Products	Goldsmith—Borger, Texas	.....	Planned
	50	....	Ethylene	Sweeny—Pasadena, Texas	.....	Planned
Pittsburgh Consolidation Coal Co.—Pittsburgh	108	....	Coal	Georgetown—Eastlake, Ohio	.....	Eng. Underway



- Pinhole-free, x-ray quality welds in any position. Fewer rejections, faster production, better quality work.
- Feather-touch slag removal—cleaning time reduced to an absolute minimum.
- Deep penetration for root pass welds. Makes XL-610 especially suited to heavy plate fabrication, pipeline, shipyard, pressure vessel and construction work.
- Extremely low spatter loss, even with high currents. Higher deposition rates, easier cleaning.
- PLUS these exceptional "physicals". . .

J-21911

YOU CAN BE SURE... IF IT'S Westinghouse

ABS Specifications	Westinghouse XL-610		
	5/32"	3/16"	1/4"
Percent elongation in 2" . . 22%	28	28	34
Yeld strength, psi 50,000	52,900	54,800	53,800
Ultimate strength, psi . . . 62,000	65,900	64,500	62,400

WESTINGHOUSE ELECTRIC CORPORATION
Welding Dept., Box 868
Pittsburgh 30, Pa.

Gentlemen: Please rush full information plus samples on new Westinghouse XL-610.

Name_____ Title_____
Company_____
Street & No._____
City_____ Zone_____ State_____

For more data on advertised products, use Readers' Service Cards, last page.

Pipe Line Contracts Not Let—(Continued)

COMPANY	Length in Miles	Diameter	Type	Origin and Terminus	Estimated Cost	Status
S. & M. Pipe Line Co., Ltd.	100	8, 10	Crude	Midale, Forbisher, Steelman, Lampman, Alida, and Nottingham, Sask. to Crome, Manitoba	.....	Proposed
Salt Lake Pipe Line Co.	....	....	Products	El Paso, Texas—Albuquerque, N.M.	$4 million	Planned
Santos Jundiai Railway Co.—Brazil	....	8, 14, 22	Crude & Products	Expansion of Santos—Sao Paulo system	$5 million	Planned
Shamrock Pipe Line Corp	100	6	Products	Amarillo—Abernathy, Texas	.....	Planned
Shell Pipe Line Corp.	22	6	Crude	Ropes Field, Texas	.....	Proposed
	15	4	Crude	Brahaney Field, Texas	.....	Proposed
Southern Calif. Gas Co. and Southern Counties Gas Co.	278	30	Gas	Topock, Ariz.—Los Angeles	$31 million	Planned
Southern Counties Gas Co.	31.5	30	Gas	Cactus City—Desert City, Calif.	$2.5 million	Proposed
Southern Pacific Pipe Lines, Inc., San Francisco	61	16	Products	Colton—Watson, Calif.	.....	Contracts have been let for 785 miles
Standard Pipe Line Co.	350	16	Crude	Glendive, Mont.—Guernsey, Wyo.	.....	Before ODM
	330	16	Crude	Wink, Texas—Albuquerque, N.M.	.....	Before ODM
Sturgeon Pipe Line, Ltd.	100	12	.....	Sturgeon Lake Field—Trans-Mountain system	$6,500,000	Planned
Sunflower Pipe Line Co.—Tulsa, Okla.	265	3-6	LPG	Kearny, Grant and Haskel Counties, Kansas—Wichita, Kansas	$3.5 million	Authorized
Tennessee Gas Transmission Co.—Box 2511, Houston	370	30	Gas	Agua Dulce, Texas—Kinder, La.	$35.4 million	Authorized
	220	26, 30	Gas	Loops in Kentucky and Ohio plus 376 miles of Supply laterals in Texas and Louisiana	$56 million	Before FPC
Texas Eastern Transmission Corp. and Texas Eastern, Penn-Jersey Corp.	11	....	Gas	Loops in Philadelphia area plus compressor facilities	$2.4 million	Authorized
Texas Gas Transmission Corp.	198	20	Gas	East Lake Palourde, La.—main trans. line	$20 million	Before FPC
Trans-Canada Pipe Line, Ltd.—Calgary, Alberta	2240	30, 36	Gas	Alberta—Eastern Canada	$297 million	Planned
Transcontinental Gas Pipe Line Corp.—3100 Travis St., Houston	....	....	Gas	Connecting facilities with Texas Eastern Penn-Jersey in Pennsylvania and New Jersey	$131,628	Authorized
	24.2	....	Gas	Gathering Lines from South Bayou Mallet, Maxie and Happytown Fields, La.	$754,000	Authorized
	27	....	Gas	Loops in La., Ga., N.C., Va., and Md.	$3,426,000	Before FPC
Trans-Prairie Pipelines, Ltd.	24.5	3, 4, 6	Crude	Gathering lines in Midale, Forbisher and Alida oil fields, Canada	.....	Proposed
Triangle Pipe Line Co.	560	12	Products	Arkansas City, Ark.—Covington, Ky.	$24.5 million	Proposed
Trunkline Gas Co.	24	....	Gas	Eight new compressor stations and loops	$18.7 million	Authorized
Union Gas Co. of Canada, Ltd.—Chatham, Ontario	180	24	Gas	Dawn Gas Field to Lamberton County to deliver gas to Dominion Gas Co.	.....	Planned
Union Oil Co. of Calif.	815	....	Shale oil Products	Rifle, Colo.—Los Angeles	$56 million	Planned
United Gas Pipe Line Co.	63	16, 20	Gas	Various locations in Miss., Ala. and Florida	$8.3 million	Before FPC
United Natural Gas Co.	50	12	Gas	Elk County—Jefferson County, Pa.	.....	Planned
U. S. Dept. of Defense	97	....	Crude	Elk Hills Naval Reserve—Los Angeles	$8 million	Considered
U. S. Navy	450	8	Gas	Gubik Field—Fairbanks, Alaska	$20 million	Planned
Utah Natural Gas Co.	40	16	Gas	Orem—Salt Lake City, Utah	.....	Planned
Virginia Natural Gas Co.	153	....	Gas	Buckingham—Richmond and Portsmouth, Va.	.....	Planned
Warren Petroleum Co.	54	4-30	Gas	Lea County, N.M.	.....	Planned
West Coast Pipe Line Co.—Mercantile Bank Bldg., Dallas	960	24, 26	Crude	Wink, Texas—Norwalk, Calif.	$106 million	Planned
Westcoast Transmission Company, Ltd.	650	30	Gas	Peace River Fields—Sumas, Wash. Connecting with Pacific Northwest Pipeline—Second Line	$140 million	Planned
Wilcox Trend Gathering System, Inc.	16	16	Gas	Loop near Provident, Texas	$2.2 million	Authorized
Winnipeg and Central Gas Co.	450	4-8	LPG	Tioga, N.D.—Winnipeg, Canada	$20 million	Planned
Wyoming Gas Products Corp.	....	....	Gas	Gathering system in Weston County, Wyo. to feed gasoline plant	.....	Planned
Yacimientos Petroliferos Fiscales Bolivianos	170	4	Crude	Bermejo—Tupinza, Bolivia	.....	Planned

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CLUSTER
REPACK
SEPARATOR
STRAINER

the only high volume pipeline strainer that removes free water from petroleum products!

The HP-700 is rated from 750 to 1000 GPM on gasoline and fuel oil. The four re-pack cartridges provide a total filtering area of approximately 5,500 square inches. This Separator-Filter effectively removes solid particles down to forty microns in size. Equipped with quick opening closures and other easy service features, this compact unit is designed especially for the pipeline industry. Write for detailed information.

DIVISION OF FRAM CORP.

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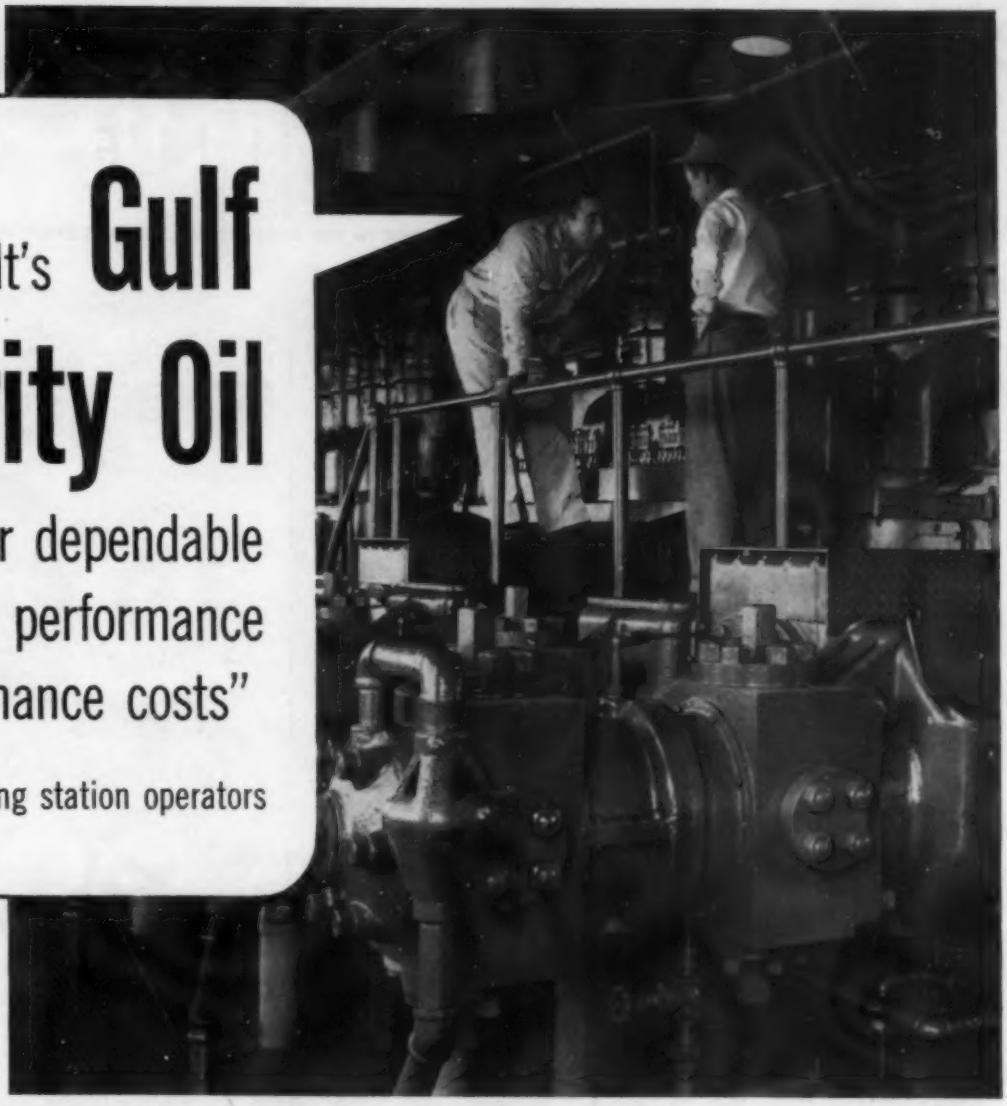
"It's Gulf Security Oil

for dependable gas compressor performance and low maintenance costs"

say pumping station operators



Smooth, continuous operation is a must for these units in service at a South Texas gas compressor plant. They are responsible for the steady flow of essential natural gas through pipe lines to homes and industries as far north as Detroit and New York. Gulf Security Oil provides the sure, effective protection needed for cylinders and bearings in both engines and compressors.

You can depend on Gulf Security Oil to provide the proper lubrication that is so important to vital compressor units if operating troubles are to be prevented and maintenance costs kept low.

Gulf Security Oil has a record of outstanding performance in scores of gas transmission plants. After years of operation with this quality oil, the cylinders and piston rings of both the compressors and power assemblies show negligible wear. And few carbon deposits have formed on power cylinder ports and pistons.

If you are installing new compressor units, or feel that you're not getting the most effective lubrication possible for your present units, it will certainly pay you to try Gulf Security Oil. Contact your nearest Gulf Office and have a Gulf Sales Engineer call.

Gulf Oil Corporation • Gulf Refining Company

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GULF

The finest petroleum products for your every need

How to do it

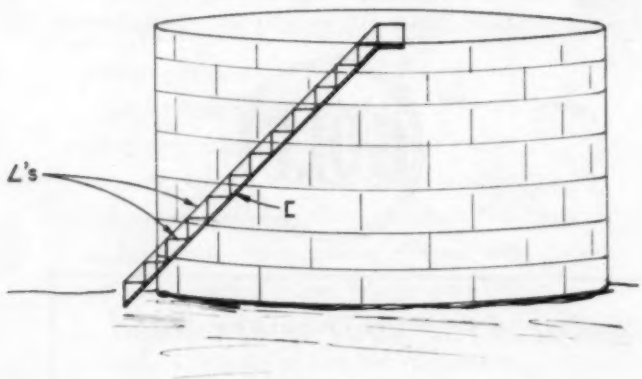
PIPE LINE HINTS

$10 is paid for each illustrated acceptable contribution. Mail to The Editor, PIPE LINE INDUSTRY, P. O. Box 2608, Houston 1, Texas

Make Lifting Boom for Tractor To Do Many Station Jobs

This shop-made lifting boom operated off a tractor's hydraulic lift saves time and work around Tennessee Gas Transmission Company's Station 71 at Middleton, Tenn. Here I. E. Pettigrew makes use of Lennie Hargett's device to move a motor to the shop.

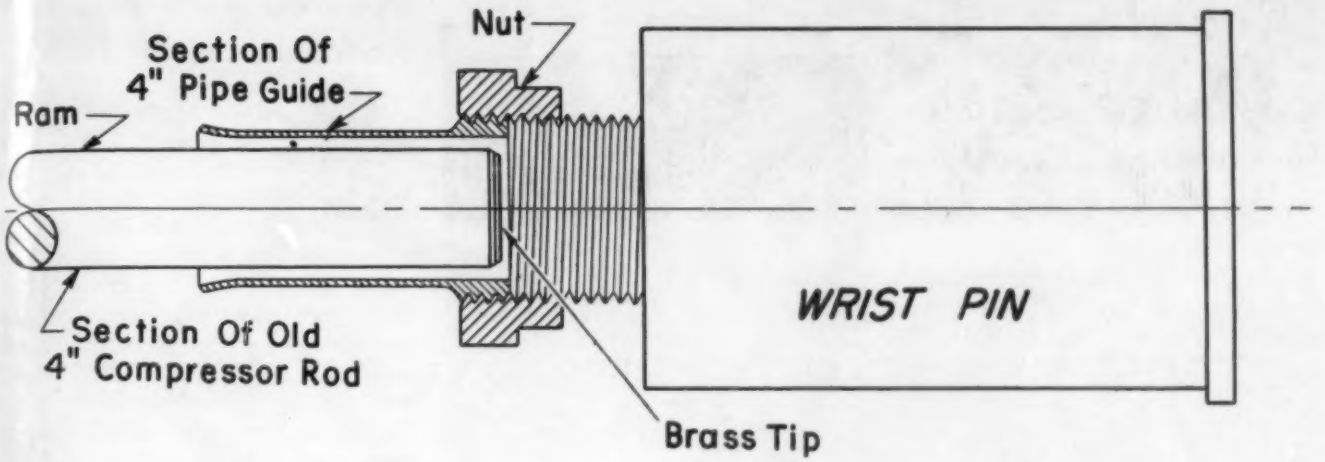
The boom may be fabricated from scrap material and mounted on the rear of the tractor as shown. Then when the tractor is backed up to the equipment, the boom lowered and the sling made fast, the load can be lifted and hauled away.



Truss Design Cuts Weight And Cost of Tank Ladder

Weight of the steel needed to carry a specified load on a tank ladder can be reduced to a minimum by designing the side rails as a truss. Handrails and supports will then carry a good share of the load on the ladder.

The lower member is made from a proper size channel and the side members and handrail from angle stock. Construction of the trusswork may be either welded or bolted.



Tool Saves Hour in Removing Crosshead Wrist Pins

Use of the device shown here can save an hour on the removal of each wrist pin from the crosshead of a compressor engine.

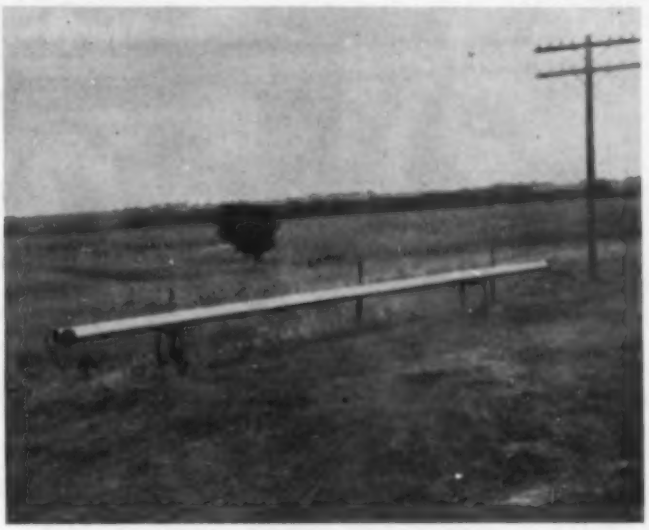
To remove the pin, the wrist pin nut is first screwed about halfway on the wrist pin and the guide is screwed into the nut. The ram is then inserted into the guide and centered against the face of the wrist pin stud. Striking the ram on the end a few times with a sledge is sufficient to loosen the pin. A brass tip on the ram prevents damage to the wrist pin. Weight of the ram is supported by a sling from overhead.

Orange Paint Makes Emergency Joint "Shine" for Patrol Plane

Spare joints of pipe kept along the right-of-way for emergency repairs can serve also to guide the aerial patrol along the line.

The coating or paper wrap is painted a vivid yellow-orange. This color was selected because it is one that is conspicuous at all times of the year in the Midwestern area where the line is located.

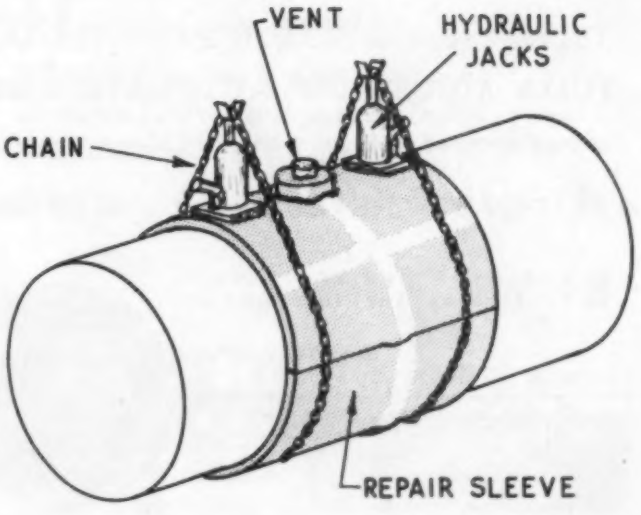
In addition to having a section of pipe readily accessible for replacement, the pipe line company has the line marked with good patrol beacons at a very low cost of labor and money.



Use Modified Sleeve to Make Circumferential Weld Repairs

To repair leaks in circumferential welds, two pipeliners came up with the design of the split welding sleeve shown. A long pattern weld sleeve was used in fabrication to allow greater venting of gas and to provide more repair area for a leak occuring in the circumferential weld. It covers a repair area six inches in diameter and allows a two-inch vent.

The sleeve is held in position by applying tension on two chains using hydraulic jacks as shown. Care should be used in tightening up on the chains to make sure that the sleeve is held safely without parting the chains.



Keep Old Gloves on Tractor For Greasing-Up Operations

Here is a good idea for a tractor or machine operator. Keep a dirty pair of gloves hanging on seldom used levers so they will be handy for greasing-up operations. It will save on work gloves and help keep things clean.

Make Valve Box Wall From Steel Culvert Tube

A short section of standard corrugated steel road culvert tube can be used for the retaining wall of valve boxes along the pipe line.

Cut the culvert tube long enough to extend 6 to 8 inches above grade when it is positioned over the valve. A lid can be made from a circular piece of 12-gage sheet steel. Cut the circular plate in two segments and weld hinges to the matching edges. Fasten the top to the tube by brazing small steel angles to the exposed wall and to the underside of the overhanging top.

It takes rugged, dependable truck winches to move today's portable draw works, power units and masts. You are always sure and safe when your trucks are equipped with BRADEN WINCHES. They are made in capacities from 3,000 to 100,000 pounds.

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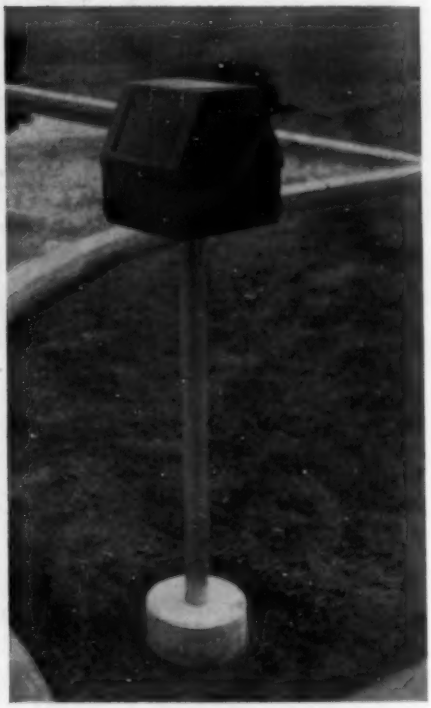
BRADEN Winches



Smoker Stand Improves Station Safety, Appearance

This handy stand improved appearance and safety practices at a pipe line station. To make it, bore an 8-inch hole with an augur and pour the concrete neat. Top of the concrete base is formed by using an inverted ice cream carton. To hold the pipe upright while the concrete is being poured, drive it about a foot into the ground. The sand box can then be screwed on to the pipe after the concrete sets.

Butts may be placed in the stand through a push door on either side. Sand in the bottom puts them out.

TRACTION and CLEARANCE

for rough or soft terrain

DIGGING ABILITY

to trench fast and deep

Tractor-type treads on Bucyrus-Erie dragshovels bring new traction and mobility to pipeline trenching. Ten years of development has resulted in high clearance, improved lubrication, strong parts, wide bearing area, and long track life. You can climb grades up to 35 per cent with adequate footing, move more easily over soft, swampy ground, and save travel time in rocky, rough terrain. Here is dragshovel mobility that's tailor-made for rugged pipeline duty.

With a Bucyrus-Erie dragshovel you get high speed on the hoist and swing, great power on the digging stroke, too, for maximum output. The heavy boom adds power to digging strokes, helps dipper penetrate easily even at maximum depth and reach. Dipper has sloping sides, straight cutting edges on side cutters, and extended lip area for clean trenching, easily-heaped loads.

See your Bucyrus-Erie distributor soon . . . and get all the facts on these popular favorites of pipeline contractors — the ½-yd. 15-B and ¾-yd. 22-B dragshovels. 120E55

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YEARS OF SERVICE
to Men Who
Shape the Earth

For more data on advertised products, use Readers' Service Cards, last page.

"Why was that young roughneck peeling potatoes on the derrick floor?"

"He was spudding in."

Joe Roughneck is the guy who gets the job done in the oil industry. He may be on a rig in the oil field or directing far flung operations from a plush office . . but he knows oil . . and pipe . . and he's the backbone and the symbol of the petroleum industry.

For Joe's personal convenience . . Lone Star's completely integrated steel mill is turning out API casing, tubing and line pipe of the highest quality. Joe likes to do business with the home folks at Lone Star where the largest mill stock in the Southwest is maintained and fast delivery is routine.

Neighbor, wherever you are, specify Lone Star and we both get a good deal!

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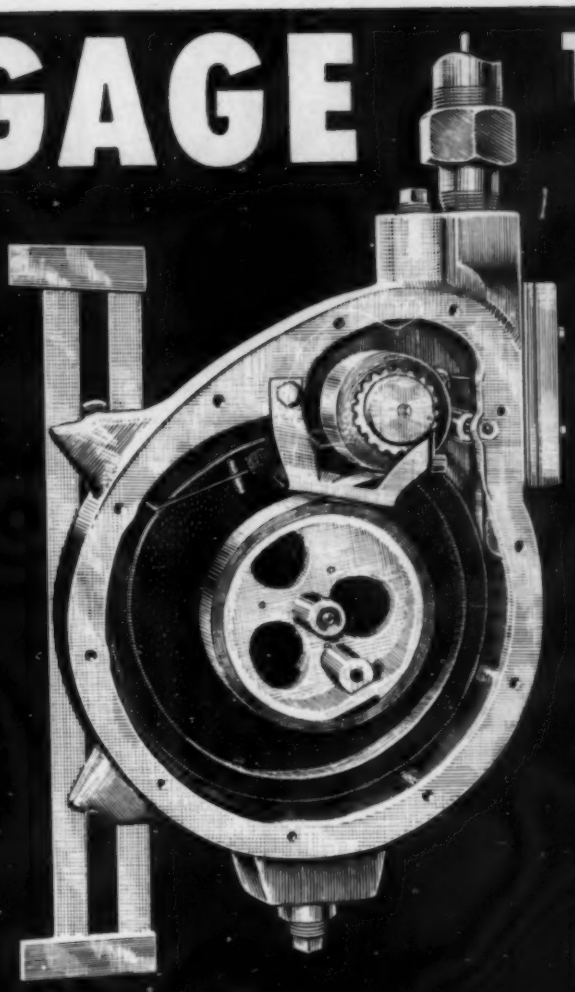
Standardize Regulator Units For Fast, Easy Installation

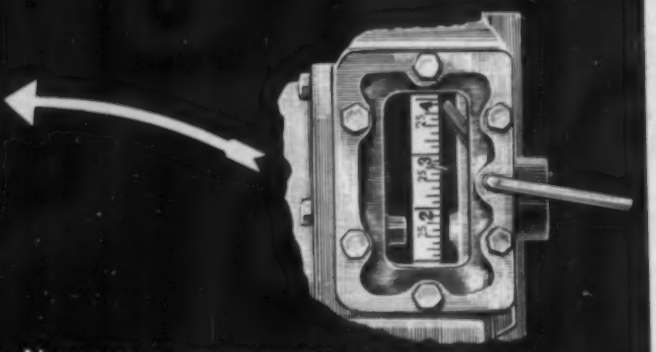
If a pipe line company has many take-offs from a high pressure line, maintenance work may be reduced by standardizing on a compact regulator unit. It may be built in the shop and quickly installed on the line. By making units alike, one may be unflanged and taken in for service and another one installed.

The unit is placed on two 2-inch flanged connections, one from the main line and the other on the service line. Each unit is built around a main support of 6-inch pipe which serves as the downstream leg. This large line is used to allow for hydrate formation in the winter. The pressure connection is taken off the middle of this leg so that the driest gas will go to the diaphragm.

The high pressure leg is connected to the low pressure by three pieces of 2-inch pipe as shown. By blanking off one side, the lower pair are used for the by-pass connection and the relief valve is connected to the upper one. The regulator is installed at the highest point so it is located where the gas is dry and away from molestation. It also is connected with flanged fittings for quick service.

GAGE TO A "CAT'S WHISKER"





Now you can gage tank contents with greater accuracy and greater dependability, over a longer period of time, with the new Shand & Jurs Fig. ST-8000 Automatic Tank Gage. This new S&J gage incorporates a Neg'ator motor that eliminates counterweight and cable assembly. The design provides one gage to serve all tanks up to 65' in height and maintains constant tape tension throughout float travel, thus delivering "cat's whisker" accuracy at all liquid levels.

The minimum fatigue life of the S&J ST-8000 Automatic Tank Gage is 13,000 cycles, equal to up and down twice a day for nearly twenty years. Bearing loads have also been materially reduced.

The new S&J Fig. ST-8000 gage is also provided with a new, easy to read, hi-visibility tape. It is installed closer to the reading window, thus reducing chances of reading errors. The gage head is equipped with large, adjustable mounting bracket that accommodates full length of the slip joint, providing quick, easy installation and adjustment of the gage at convenient eye level. For complete information on the new S&J Fig. ST-8000 Automatic Tank Gage write the factory or nearest branch listed below for bulletin ST-8000-55.

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REPRESENTATIVES:
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For more data on advertised products, use Readers' Service Cards, last page.

MERCOID®

PRESSURE & TEMPERATURE CONTROLS

ENGINEERED FOR SEVERE OPERATING CONDITIONS

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Only Mercoid Offers

- ***HERMETICALLY SEALED CONTACT***

Always dependable—whether it operates once per year or several times per minute. It remains operative at all times because dust, dirt, grease or moisture cannot contaminate the contacting elements. There can be no sticking or welding of the contact points.

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Independent outside adjustments are provided for setting both the cut-in and cut-out points. Differential may be widened as desired. No tools are required.

- ***VISIBLE CALIBRATED DIAL***

No guesswork or calculations are required—the pointers indicate on an accurately calibrated dial, the exact operating pressures or temperature.

- ***VISIBLE OPERATION***

You can tell at a glance whether switch circuit is on or off.

- ***BOURDON TUBE OPERATED***

UNDERWRITERS' APPROVED

All operating ranges for Series DA-21, DA-35 and DA-55.

Available for general use, outdoor use or hazardous locations.

WRITE FOR BULLETIN 4B

THE MERCOID CORPORATION
4211 Belmont Ave., Chicago 41, Ill.

Portable Docks Solve Storage Problem

During pipe line construction there is often some difficulty in finding storage space for materials and equipment that should not be left on the ground. Items such as flanges, ground surface pulleys and portable engines are subject to corrosion, dirt and moisture.

One company has solved its outside storage problem by fabricating a number of portable docks. Each one is four feet high, five feet wide and ten feet long. They are made of scrap 2-inch pipe and floored with rough oak lumber. When placed end to end as shown, they form an ideal unloading dock at about the height of the bed of a bobtail truck.

Equipment can be loaded and unloaded with a minimum of effort, and all materials are kept up off the ground. When the schedule requires moving, it is a simple matter to load these temporary docks and move them on to the next location.

insist on the highest quality

Gotkool

water cans and coolers

KEEP PURE DRINKING WATER ALWAYS HANDY

Specify **"GOTKOOL"** the next time you order water cans or coolers. **"GOTKOOL'S"** exclusive construction keeps water cooler . . . fresher . . . purer. Extra wide, snug-fitting, splash-proof top keeps out impurities. Non-leaking, push-button faucets, either extended or recessed flush mounted. *Buy* **"GOTKOOL"** *at your supply store today.*

GOTKOOL Water Cooler — made in 2, 3, 5, 8, 10, 15, and 20-gallon sizes with extended or recessed flush-mounted faucet optional. *(Note: 15- and 20-gallon sizes available with extended faucet only.)*

GOTKOOL Water Can — made in 1½, 2, 3, 5, 10, and 20-gallon sizes without faucets. Extended or recessed flush-mounted faucets available at slight additional cost. *(Note: 15- and 20-gallon sizes available with extended faucet only.)*

Insist on the genuine — look for the *Blue and Black Label* with the name "GOTKOOL" in Red.

H. P. GOTT MFG. COMPANY
WINFIELD, KANSAS

WHAT'S NEW AT BRISTOL

NERVE CENTER. Central dispatching office of Valley Gas, where dispatcher John Bonner checks the readings of pressure, flow, and temperature at 49 points in the company's distribution system on Bristol Metameter Receivers.

New telemetering system checks 49 functions by phone!

104 COMMUNITIES in northern Mississippi are served by Valley Gas.

Mississippi Valley Gas Company uses Bristol Metameter* Telemeters in most extensive "Selective Calling" telemetering system

By simply dialing a code number on a standard telephone dial, a dispatcher can get a reading on a Bristol Metameter receiver of pressure, flow, or temperature from any one of 49 Metameter transmitters installed at 21 different field locations along Mississippi Valley's retail gas distribution system.

There are also Bristol Time-Multiplexing circuits installed at two communities. With these, the dispatcher can dial one code number and have seven readings from the community in question indicated at the same time on the panel board — thus reducing dialing time. The function and the location being received is indicated by a system of bullseye lights on the panel.

We'd like to tell you how Bristol Metameter Telemeters can help you, too. Write today for free 40-page booklet M1710. Address The Bristol Company, 114 Bristol Road, Waterbury 20, Conn. 4.39

Reg. U.S. Pat. Office

TRADE MARK BRISTOL'S REG. U.S. PAT. OFFICE

BRISTOL

POINTS THE WAY IN HUMAN-ENGINEERED INSTRUMENTATION

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

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Raised Skid Base, Trough Aids Cleaning

To save cleaning time around a station having skid-mounted units, pour the skid base higher than the floor and make a trough drain around it. Set forms so that the base will be a few inches higher than the floor. Make a slanting trough completely around the base and install a drain to a point outside the station.

Then when it is necessary to clean a unit, the operator can turn on the hot water hose and wash dirt and grease into the trough and down the drain.

Proven Economy!

OVER 25,000 CROSSINGS EQUIPPED WITH WmSON BUSHINGS & INSULATORS SINCE 1950

CONCENTRIC SUPPORT INSULATOR
Molded hard rubber blocks (8,000 lb. per sq. in. compressive strength) insulate pipe from casing and protect pipe coating . . .

Type "Z" WmSEAL CASING BUSHING. POSITIVE SEAL . . . POSITIVE INSULATION. Heavy sleeve of tough synthetic rubber withstands abuse and weight of backfill earth. INSTALLED QUICKLY . . . No Shield Required.

LOW COST plus **ENGINEERED DESIGN** give **LASTING ECONOMY** for your Highway and Railroad Crossing Jobs . . .

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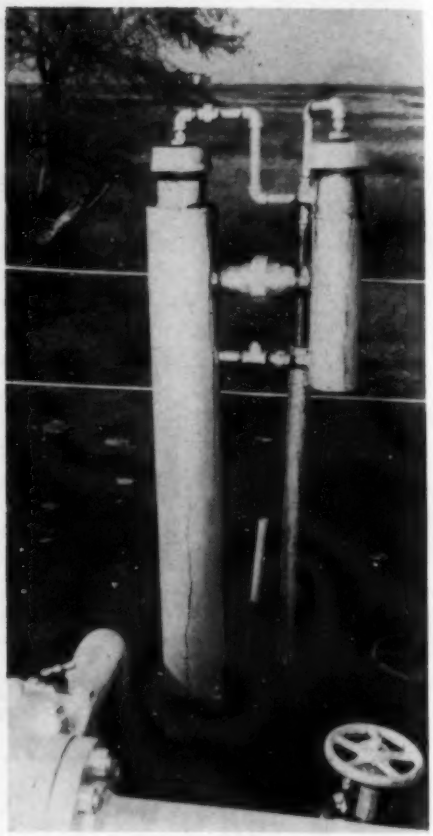


Shop-Made Float Chamber Prevents Gas Lock on Pump

A shop-made chamber fitted on the upstream side of a field pump will keep air from entering the pump and causing an air lock. The float chamber is connected to the side of a riser on the suction line with a union and a blind flange as shown. A check valve in the lower half-inch line allows the vessel to drain.

The upper line serves as a vent line; as long as air or gas is in the riser it will pass out through the top of the float chamber. When the riser fills with liquid, the float inside the chamber rises and cuts off the flow so the pump will carry liquid. When another slug of air or gas enters the riser, the float valve will open and vent it.

The float chamber is connected to a sump to take care of any leakage through the float valve.

Allis-Chalmers presents the new

HD-11

ANOTHER BIG STEP AHEAD IN LOW-COST PIPE HANDLING

90 net engine hp
75 drawbar hp
20,500 lb

...with all the important performance advantages of Allis-Chalmers advanced basic design...tested and proved over millions of operating hours!

All-Steel Box-A Main Frame that soaks up shock loads, makes possible the service simplicity of unit construction.

Exclusive One-Piece Steering Clutch and Final Drive Housing with all final drive gears straddle-mounted on tapered roller bearings to insure long life.

Unit Construction lets you remove engine, master clutch, transmission, steering clutches and final drives without disturbing adjacent parts.

1,000-Hour Lubrication Intervals for roller bearing truck wheels, idlers and support rollers... makes production time out of service time.

Dual-Range Constant-Mesh Transmission lets you go from any forward speed to any reverse speed by shifting only one lever. Eliminates double shifting! That means faster work cycles... more production!

NEW STANDARDS OF PERFORMANCE AND LONG LIFE ON A WIDE RANGE OF JOBS

You owe it to yourself to investigate the performance advantages of the HD-11... newest addition to the Allis-Chalmers leadership line. See your nearby Allis-Chalmers dealer now.

New Allis-Chalmers Diesel Engine with "follow-through" combustion and tornado turbulence... for smooth engine performance, cleaner combustion, extra long engine life.

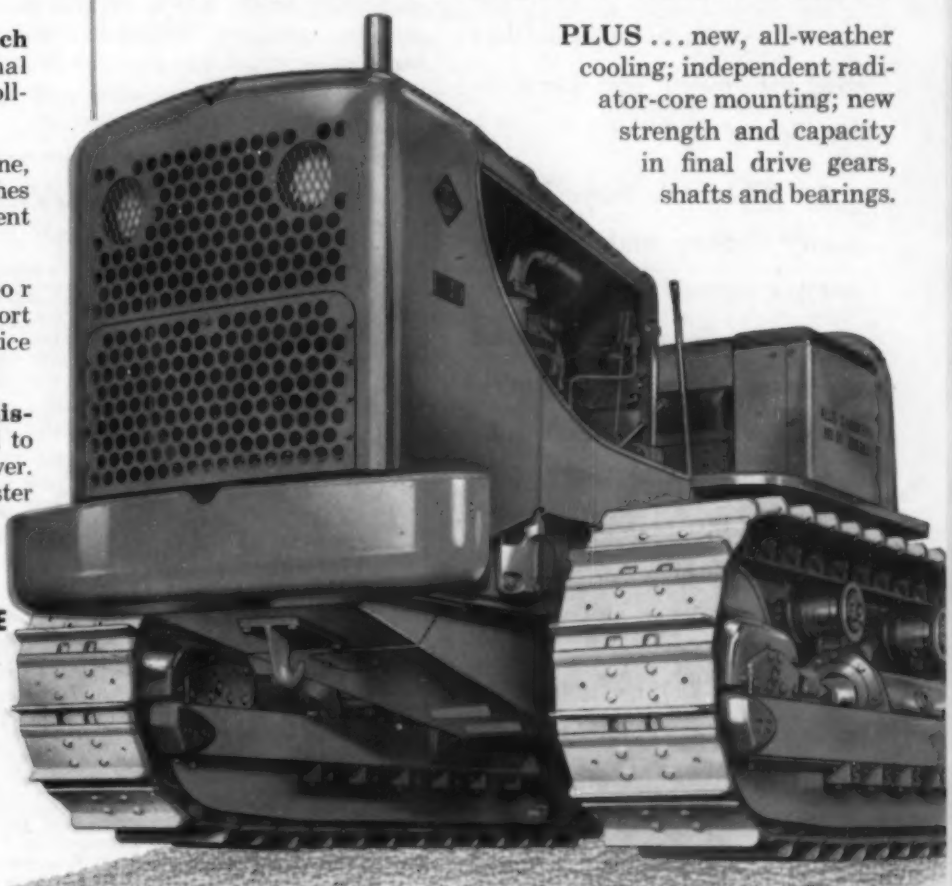
New Wrap-Around Radiator Guard used as dozer lift frame to simplify design, reduce cost of bulldozer; guard tilts forward for easy service.

New Master Clutch with Ceramic Lining sets new standards of clutch life... with fewer adjustments required.

New Operator Convenience including roomy, flat platform... foam rubber seat... 24-volt direct electric starting... 60-gal. fuel tank

Tough New Track — New design, through-hardened with extra toughness for long life even in severe abrasive conditions.

PLUS... new, all-weather cooling; independent radiator-core mounting; new strength and capacity in final drive gears, shafts and bearings.



ALLIS-CHALMERS
TRACTOR DIVISION — MILWAUKEE 1, U. S. A.

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"Bargain" Bid

Just a
"DOWN PAYMENT?"

or will your first cost be your last cost?

THE ANSWER DEPENDS UPON YOU. If you buy only because the bid is low you might be married to high replacement and maintenance costs for years to come. In that case the lowest cost becomes the highest cost.

But if you buy Mayes Bros'. quality coating and wrapping you are assured of a full measure of the finest enamels and wrapping put on by experienced men who specialize in wrapping PERMANENCE into pipe. Our first cost is your last cost—which makes our cost your least cost.

Let Mayes Bros'. 27 years experience putting PERMANENCE in pipe be your answer to first quality, long-lasting protection that actually costs less in the long run.

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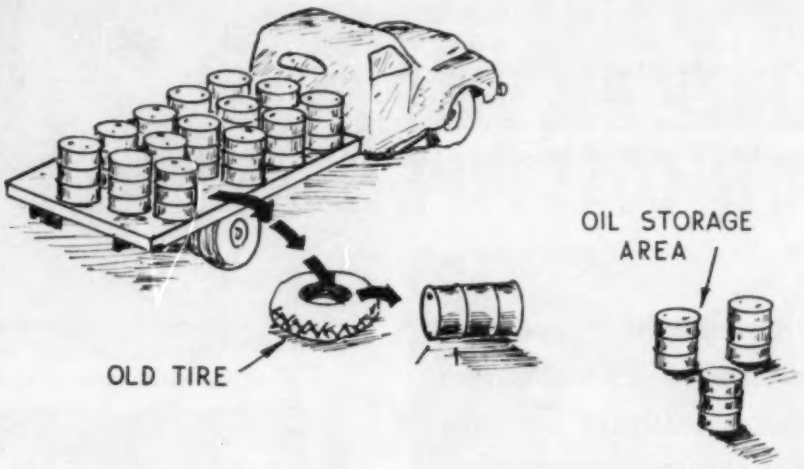
HINTS . . .

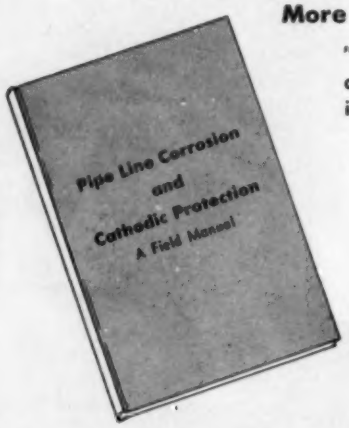


Old Truck Tire Saves Lube Oil Drum

Unloading 300-pound drums from a truck often damages drums and sometimes results in loss of lube oils or other products. To prevent this, leave an old truck tire near the drum storage. When unloading, simply drive alongside the tire and drop the drums off on it. The tire takes the impact, and drums can be turned upright or rolled to the storage racks. The result—longer drum life and no loss of product.

More comments on this new Handbook:

"... a most practical on-the-job manual for men concerned with pipe line corrosion. We are ordering copies for each of our district engineers."



Pipe Line Corrosion and Cathodic Protection

By MARSHALL E. PARKER

This Handbook, written by Marshall E. Parker, consultant, is designed as a practical field manual. It is a 108-page pocket-size volume printed first as a popular series in WORLD OIL. The Handbook is illustrated with many charts and drawings and is completely indexed by subjects.

It presents comprehensive data on Soil Resistivity Surveys, Potential Surveys, Line Currents, Current Requirements, Rectifier Systems, Ground Bed Design, Magnesium Anodes, Stray Current Electrolysis, Interference in Protective Systems, Operations and Maintenance, and Coating Protection and Testing.

An appendix has been added of technical data on Underground Corrosion, Basic Principles of Cathodic Protection, Properties of Metals and Attenuation Equations. Order copies of this practical Field Manual now for each of your field men. Price $3.

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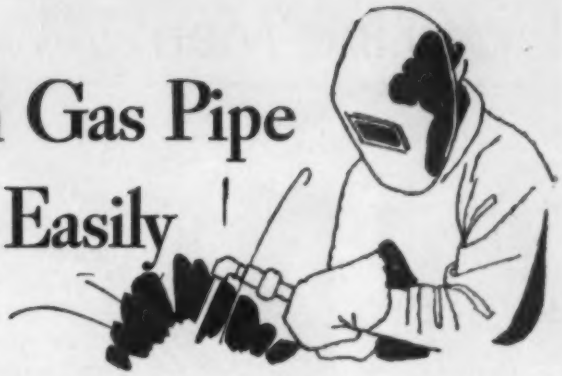
Bethlehem High-Strength Gas Pipe Resists Fatigue—Welds Easily



Bethlehem High-Strength Gas Pipe is recommended for pipe-line compressor stations and other locations where severe vibrations or extremely high pressures are encountered.

This pipe is fabricated from as-rolled plates of Mayari R, Bethlehem's high-strength low-alloy steel. Mayari R has a yield point of 50,000 psi min, an endurance limit of approximately 50,000 psi, high corrosion resistance and excellent workability and weldability.

RESISTANCE TO FATIGUE—Mayari R steel's endurance limit is unusually high—about 50,000 psi (60 to 75 pct of its tensile strength of 70,000 psi minimum). In addition, Mayari R steel is extremely ductile, with 22 pct minimum elongation in 2 in. Pipe fabricated from Mayari R plate has the exceptional endurance strength, extreme ductility and high impact qualities needed for handling vibration, pulsation and variable shock-loadings.

LIGHTER WALLS—When you use Bethlehem High-Strength Gas Pipe you can specify much lighter walls than with ordinary carbon-steel pipe. This results in savings in material, as well as in the cost of transportation, handling and field welding.

WELDS READILY—Bethlehem High-Strength Gas Pipe is readily welded by following normal field-welding procedures, using mild steel electrodes.

FOR NORMAL PIPELINE SERVICE we recommend Bethlehem Gas Pipe fabricated from carbon steel, meeting specifications ASTM A134 or API 5LX42. Comparative weights and test pressures for these grades of pipe, as well as for pipe made from Mayari R, are shown in the table below.

All grades of Bethlehem Gas Pipe are made in 40-ft lengths, with beveled or square ends, and in all diameters from 18 in. OD. We can grit-blast, prime, coal-tar enamel and wrap the pipe to your specifications.

A phone call or letter to the nearest Bethlehem sales office will bring you full information about Bethlehem Gas Pipe, in Mayari R or carbon-steel grades.

Comparative Maximum Test Pressure: MAYARI R, API 5LX42 and ASTM A134 Steel Pipe

Pipe OD In.	¼ IN. THICK				⅜ IN. THICK				½ IN. THICK				¾ IN. THICK				1 IN. THICK			
	Wt lb per ft	Test Pressure psi Mayari R	API 5Lx42	ASTM A134*	Wt lb per ft	Test Pressure psi Mayari R	API 5Lx42	ASTM A134*	Wt lb per ft	Test Pressure psi Mayari R	API 5Lx42	ASTM A134*	Wt lb per ft	Test Pressure psi Mayari R	API 5Lx42	ASTM A134*	Wt lb per ft	Test Pressure psi Mayari R	API 5Lx42	ASTM A134*
18	49	1180	990	665	73	1770	1490	960	96	2360	1985	1275								
20	54	1120	920	575	81	1590	1340	860	107	2130	1785	1150								
22	63	965	820	520	93	1450	1220	815	118	1935	1630	1040								
24	67	885	750	475	99	1330	1120	745	130	1770	1490	955								
26	73	820	690	440	107	1225	1030	690	141	1635	1380	880	202	2450	2050	1325				
28	79	760	640	405	117	1140	955	640	153	1515	1275	820	219	2270	1910	1225				
30	85	710	595	380	125	1060	895	600	164	1415	1190	765	235	2130	1785	1145				
32	92	665	560	355	134	1000	835	560	176	1325	1115	715	252	1990	1675	1075	330	2650	2230	1430
34	97	625	525	335	143	940	785	505	187	1250	1050	675	268	1875	1575	1010	352	2500	2100	1350
36	105	590	495	315	152	885	750	480	200	1180	980	635	285	1770	1490	950	374	2360	1980	1275
42	118	505	425	270	173	760	640	410	228	1010	850	545	334	1525	1275	815	440	2020	1700	1090
48	135	440	375	235	199	665	560	360	263	885	745	475	384	1325	1115	715	506	1770	1485	955
60	170	355	300	190	252	530	450	285	331	710	595	380	483	1060	890	570	638	1415	1190	765
72	210	295	250	160	306	440	375	240	403	590	497	320	582	885	740	475	770	1180	990	635
84	238	250	215	135	353	380	320	205	464	505	425	270	672	755	635	410	902	1010	850	545

*ASTM A283 Grade B, to be used when ordering to ASTM A134 Specification. If ASTM A283 Grade C is used instead, the test pressures may be increased by 11 pct. Pipe can be furnished in diameters intermediate to those shown above.

Test pressures above are based on stressing steel to 85 pct of minimum yield point:
Mayari R—85 pct of yield point = 42500 psi
API 5LX42—85 pct of yield point = 35700 psi
ASTM A134—85 pct of yield point = 22950 psi
Formula used: $P = \frac{2ts}{D}$

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BETHLEHEM STEEL

For more data on advertised products, use Readers' Service Cards, last page.

Pipe Line Men

IN THE NEWS

H. G. Mariner

C. M. Scott

Service Pipe Line Company has announced the appointment of **H. G. Mariner** to succeed **C. M. Scott, Jr.,** as general manager. Scott, after almost 39 years of service with the company, retired June 25.

After service in South America with the Lago Petroleum Corporation, and a period with the Kansas State Highway Commission and Phillips Petroleum Company, Mariner joined Service as a draftsman and instrument man in 1940. Since, he has served as a division chief engineer in West Texas, as assistant manager of the Wyoming division, and as manager of the Missouri division. In 1954, he supervised construction of part of the company's 625-mile line from Ft. Laramie, Wyo., to Freeman, Mo. Since completing construction, Mariner has been maintenance superintendent and assistant to the general manager in the Tulsa headquarters office.

In point of service the oldest member of the board of directors, Scott joined the company in Tulsa in 1916 as an engineer-draftsman. He was made chief engineer in 1930. In 1945, he was appointed assistant general manager in charge of operations, and in 1946 was elected to the board of directors. He became general manager in 1951.

•

William R. Connole of West Hartford, Conn., has been sworn in as a member of the Federal Power Commission, succeeding **Nelson Lee Smith.**

•

R. W. McDowell, president of D-X Sunray Oil Company, has been elected a director of **Great Lakes Pipe Line Company.** He succeeds **Jacob France** who resigned after having served as a Great Lakes director since 1931.

A. A. Dorffi has been appointed staff assistant to the general superintendent of **Sohio Pipe Line Company's** Transportation department. With headquarters in St. Louis, he heads a newly-created Operations staff and will be in charge of staff engineering activities in the Transportation Operations section, administration of the automotive fleet for the department, warehouse and inventory control, and the pipe line patrol plane.

Dorffi has been assistant superintendent of Sohio's Tri-State division since 1953.

Other promotions announced by the company include **K. A. Stierman,** named senior engineer, Engineering division; **K. E. Lundquist,** named senior engineer, Administrative division; and **R. C. Rice** named senior engineer, Operations division.

•

E. F. Hindman, former general superintendent of two south Louisiana subsidiaries of **Texas Gas Transmission Corporation,** has been named manager of the newly-created Louisiana division of the company.

E. F. Hindman

The division, which will have headquarters in Lake Charles, was formed following the recent merger of Louisiana Natural Gas Corporation and Texas Northern Gas Corporation into Texas Gas. Operations will consist primarily of gathering gas from south Louisiana fields for the Texas Gas system. General offices for Texas Gas are in Owensboro.

Hindman is a veteran of 25 years in the natural gas business. After 20 years with Arkansas-Louisiana Gas Corporation, he joined Louisiana Natural Gas Corporation as pipe line superintendent in 1949. He was appointed general superintendent of Louisiana Natural in 1950, and also of Texas Northern when that company was formed as a subsidiary of Texas Gas.

Sloan Paxton

N. P. Chesnutt

Sloan Paxton, West Texas district manager for **Southern Union Gas Company,** and **N. P. Chesnutt,** chief engineer, have completed 20 years of service with the 26-year-old company.

Paxton began as a laborer in Santa Fe, N. M., in 1935. During his years with Southern Union, he also has served as fitter's helper, manager of the Quanah, Texas, Water Company, assistant district manager in Pecos and district manager of the West Texas district. He is now in charge of operations in the West Texas district.

Chesnutt began with the company as a measurement man in Pyote, Tex., in 1935. Since, he has been meter man, district engineer in West Texas, field superintendent in Farmington, N. M., and engineer in Dallas. He is now in charge of the engineering department which includes designing and planning of transmission and distribution pipe lines, compressor stations, dehydration plants and treating plants.

•

R. P. Hopson has resigned as vice president and assistant general manager of **Texaco-Cities Service Pipe Line Company** and as vice president and general manager of **Kaw Pipe Line Company. S. G. Kershner,** vice president and general manager of the Texas Pipe Line Company, was elected vice president of Texaco-Cities Service. **A. N. Horne,** vice president of Kaw, has been elected vice president and general manager of that company, with Kershner elected vice president.

Hopson, who joined The Texas Company in 1917 as a typist-clerk, was transferred to The Texas Pipe Line Company when it was organized later that same year.

V-TYPE ENGINES

Nordberg *Supairthermal* V-type engines are built with 10, 12, 14 and 16 cylinders, offering a range up to 5000 hp per engine . . . for Diesel, Duafuel® or Spark-Ignition Gas operation.

(Illustrated is a typical 12-cylinder, 2650 hp *Supairthermal* V-type Diesel engine in pipe line service.)

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Nordberg *Supairthermal* IN-LINE engines are built in 9" and 13" bore sizes, developing from 535 horsepower upwards . . . for Diesel, Duafuel® or Spark-Ignition Gas operation.

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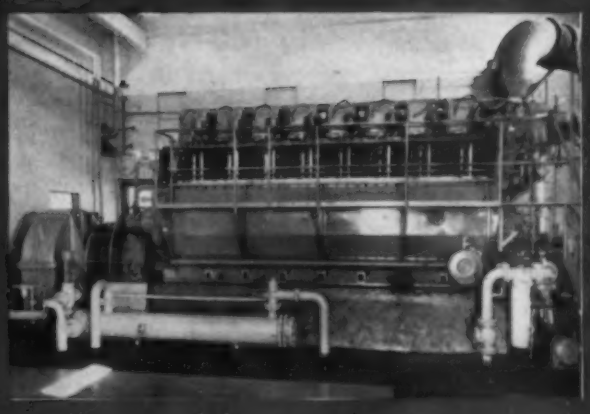

NORDBERG

DIESEL • DUAFUEL® AND SPARK-IGNITION GAS ENGINES

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Gas Industry Men Learn About Horseflesh

It was not all study of new developments in gas production and transmission at the 1955 Gas Technology Short Course at Texas A. & I. As a break, one afternoon was devoted to a tour of the giant King Ranch. Here pipeliners brush up on the fine points of breeding thoroughbreds. King Ranch colts are descended from such outstanding sires as Bull Lea and the recent Kentucky Derby winner, Middleground.

Pneumatic-Tired Lowering-in Cradle
SAVES TIME, MONEY, EQUIPMENT

Consists of an adjustable frame with rubber guide rollers and large auto-tire conveyor rollers. Coated and wrapped pipe is gently guided into the ditch while the tractor moves steadily along the line. Sizes are available for three groups of pipe diameters: 4" to 12", 12" to 24", 20" to 36". Eliminates need for extra side-boom tractor and a belt man. Saves time lost in "leapfrogging" two tractors. Speeds operations. Call for a demonstration! No obligation, of course.

ALSO: Adjustable Cradles, Five-roller Cradles, Belts, Slings, Hooks and Tongs.

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AND: Line Traveling and Stationary Coating and Wrapping Machines, Cleaning and Priming Machines — Tar-Heating Kettles, Patch-Pots, Burners, parts and accessories — Pipe protection materials: Kraft, Asbestos, Felt, Glass Wrap and Rock Shield — Line-up Clamps, Hand Tools, Materials, Supplies and Equipment of every sort.

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Officers of **Okan Pipeline Company** include **Ernest A. Slade,** president; **Charles W. Miller,** vice president and general superintendent; and **Gil V. Rohleder,** chief engineer. All also are directors of the corporation.

Slade previously has been with Parade Gasoline Company, Hanlon-Waters and Climax Industries, Inc., and Stanolind Pipeline Company, now Service Pipe Line Company. Before resigning from Service to join Okan, he directed construction of Service's 625-mile western system between Ft. Laramie, Wyo., and Freeman, Mo. Miller joined Hanlon Gasoline Company in 1933 as gasoline plant operator and later was laboratory technician in Hanlon's East Texas pipe line operation. Immediately prior to joining Okan, he was general superintendent of The Midland Gasoline Corporation's natural gasoline plant at Conroe, Texas. Rohleder started as a roustabout with Service Pipe Line Company in 1941. He joined Okan after serving as cost engineer in Service's Planning and Economics department.

Other officers of the organization include **D. M. Mattocks,** secretary; **A. J. Murphy,** treasurer; **A. B. Scurlock,** civil engineer; **G. D. Griffee,** assistant engineer; **T. M. Moore,** material supervisor; **L. A. Jackson** and **A. J. Wisdom,** right-of-way.

•

Appointment of **J. N. Carpenter** as superintendent of **Lone Star Gas Company's** Pipeline department has been announced. Advanced from assistant pipe line superintendent, he succeeds **Luther Tolbert** who retired.

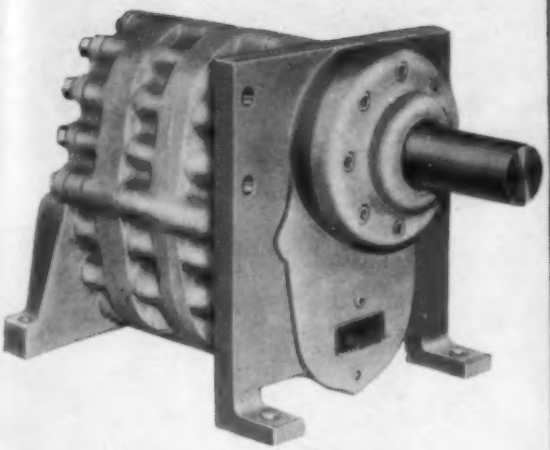
With headquarters in Dallas, Carpenter will be in charge of construction, maintenance and repair of the company's transmission network consisting of approximately 8000 miles of lines in Texas and Oklahoma.

Carpenter began his career with Lone Star in 1927 as a welder. He was named assistant superintendent in 1948.

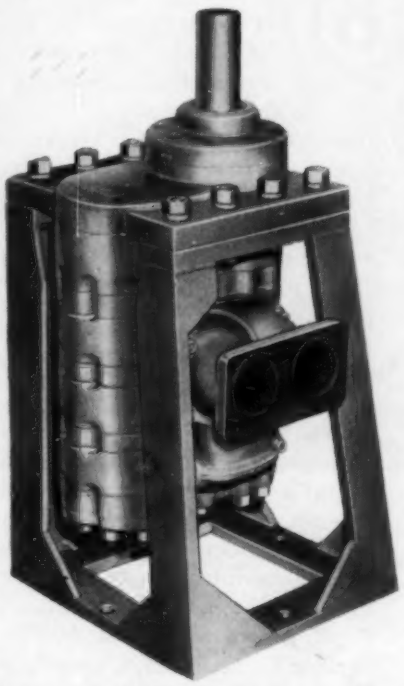
Tolbert joined the company as laborer in 1920. He was appointed assistant pipe line superintendent in 1928 and superintendent in 1948.

•

Joseph R. Burdette who has been serving as mechanical engineer in the headquarters office of the **American Oil Pipe Line Company** in Houston has been promoted to division engineer in the West Texas division.



THE BERRY PUMP can be direct or belt-driven from the compressor flywheel. Rugged construction and over-size bearings guarantee long life.



THE BERRY MOTOR is supplied with a vertical mounting stand and *the fan can be mounted directly on the shaft.* Fans can also be belt-driven by the motor if desired.

WRITE for your copy of Bulletin FD-1 giving all data on selection and advantages of Berry Drives for Aerial Cooler Fans.

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Write for locations of Berry Fan Drive Installations

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For more data on advertised products, use Readers' Service Cards, last page.

Karl T. Feldman, director of engineering and a member of the board of directors of Sinclair Pipe Line Company, has been appointed to membership on a three-man Navy-Industry Board of Review which will study the engineering and design for pump station facilities along the route of a new military pipe line being built in Spain. Purpose of the study is to insure that best industry engineering practices are integrated into the design of the military facilities to be constructed.

Other members of the board are **D. W. Calvert** of the Technical department of the Phillips Pipe Line Company, and **Earl Corliss** of the Bureau of Yards & Docks of the U. S. Navy.

•

Dal Clark, superintendent of motor transport of **Service Pipe Line Company,** has retired after 37 years with the company. He was succeeded by **Jack W. Foster, Jr.,** who was named mobile equipment supervisor.

Ray Harvey, chief oil dispatcher who has retired after 37 years service will be succeeded by **William B. Sikes,** assistant chief.

W. F. Davis

J. M. Bradley

S. A. Sheppard

W. L. Bassmann

Bruce Ramsey, former vice president and general manager of **Interstate Oil Pipe Line Company,** has been appointed operations consultant to the president. He will continue to serve as a member of Interstate's board of directors. **W. F. Davis,** assistant general manager and a director, will succeed Ramsey. **J. D. Toler,** assistant secretary, has been elected to the additional position of assistant treasurer.

J. M. Bradley, director and former Northern division manager, has been named assistant general manager directly responsible for the activities of Interstate's Engineering, Material-Traffic and Oil Movements departments. **S. A. Sheppard,** acting general superintendent, has been named general superintendent of the company's crude oil pipe line operations.

S. Brown will be responsible as director for activities of Employee Relations, Public Relations and the Medical departments. **W. L. Bassmann,** former assistant manager of the Employee Relations department, has been named manager. **O. R. Bates** will continue in charge of Public Relations with the new title of public relations manager.

•

George Sonntag, assistant to the manager of the Pipe Line department of **General Petroleum Corporation,** celebrated 35 years of oil company service with the company July 3. Sonntag joined General Petroleum in 1920 as a clerk in the Pipe Line department.

NOW

A SAFER FASTER MORE RUGGED SNATCH BLOCK

the NEW

LEBUS "TRUCKER'S" SNATCH BLOCK

Undoubtedly the Finest Snatch Block ever designed, constructed and presented to the industry. This new LeBus Block has been *engineered for all types of heavy trucking, construction and rigging work. Special emphasis* has been placed on *STRENGTH, SAFETY* and *EASE OF OPERATION.* Only TOP QUALITY carbon and alloy steels are used in the construction and all parts are drop forged, heat-treated and processed to withstand the most rugged service. Like previous LeBus blocks, the new "Trucker's" Snatch Block requires no tools other than your hands, and can be taken completely apart within a matter of seconds.

For more information write direct or have your supply source write for catalog page 1500 for complete information on the four sizes of LeBus Blocks.

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There's no time to lose on a pipeline break, so that's why Pan Handle Eastern assign this emergency task to their fast and mobile rubber-tire Lorain Moto-Hoe. A ¾-yd. "MC-254" is shown in the photo used as a hoe, digging out a break in a 26-inch pipeline, 4 miles southeast of Paola, Kansas.

Emergency — or everyday jobs on the line — here are a few important reasons why you should consider a rubber-tire Lorain Moto-Crane as a vital machine in your spread: (1) You can travel most anywhere — good going or bad — on right-of-way or highway — at speeds up to 33 m.p.h. Off-the-road, Moto-Cranes have the tractive effort, driving power and big-tire flotation to get in and out of tough spots. (2) You can quickly change a Moto-Crane to shovel, dragline, clamshell, hoe or crane to perform a multitude of jobs such as — trenching, digging valve gate holes, stringing pipe, unloading and handling all kinds of materials. Job uses are unlimited. (3) You can fit your spread from the most complete selection of rubber-tire mountings. Moto-Cranes are available in capacities from 10 to 45 tons in a wide variety of 4 or 6-wheel drive arrangements.

When it's travel *speed* and job *versatility* you want, a Lorain Moto-Crane is the answer. Your Thew-Lorain Distributor will gladly show you why — and how! Call him for complete facts.

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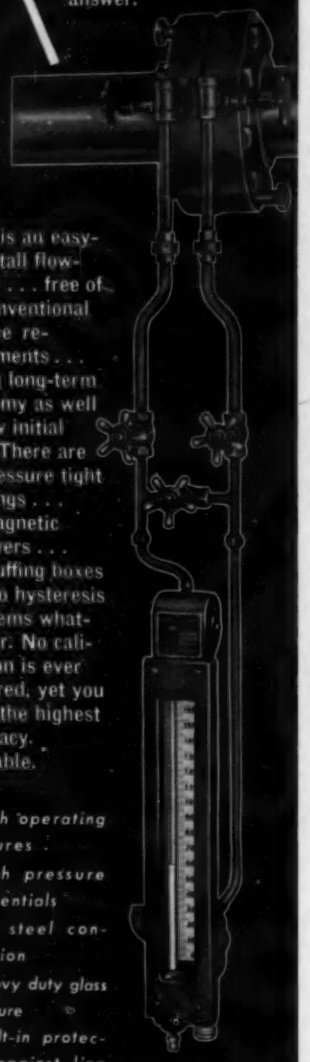
in direct flow indication
Wherever you seek simplicity and high accuracy in flow measurement at lowest cost, the Meriam "H" Meter is the well-known answer.

Here is an easy-to-install flowmeter . . . free of all conventional service requirements . . . giving long-term economy as well as low initial cost. There are no pressure tight bearings . . . no magnetic followers . . . no stuffing boxes . . . no hysteresis problems whatsoever. No calibration is ever required, yet you have the highest accuracy available.
★ High operating pressures
★ High pressure differentials
★ All steel construction
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★ Built-in protection against line surges
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What's Happening

AMONG SERVICE AND SUPPLY MEN

Lyons to Replace John Boles As Pipelife Corporation Head

Roscoe J. Lyons has been named president of Pipelife Corporation succeeding John Boles, screen star, who will remain active with the firm in a directional capacity. After 15 years in various management positions with Kobe, Incorporated, Lyons resigned as Western division manager to to take the new post.

Roscoe J. Lyons

Headquarters for the firm, which is engaged in internal plastic coating of pipe lines in place, were moved recently from San Angelo, Texas, to Tulsa.

Worthington Corporation Moves Engineering Division Offices

Worthington Corporation's Midwest Regional Engineering and Service division, formerly located at 400 West Madison Street, has been moved to new quarters at 6124 North Pulaski Road, Chicago. The expanded operation will be under the direction of L. R. Dise, manager.

A new stock of air conditioning and refrigeration parts and mechanical transmission products will be added to serve Worthington's air conditioning, refrigeration, power transmission and industrial customers.

The Chicago district sales office under direction of W. C. Cheek, manager, will continue at the West Madison Street offices.

Assistant Engineer Appointed As Niagara Filters Expands Staff

First of a series of appointments to expand the sales staff of the Niagara Filters division of American Machine and Metals, Inc., is the assignment of John M. McConney as assistant applications engineer. He recently completed five years with the Army Chemical Center. For three years previous to that he was a research and development engineer with Merck & Company.

U. S. Steel's Oil Well Division Announces Staff Appointments

Two appointments in southern Louisiana by U. S. Steel's Oil Well Supply Division have been announced. Kenneth Hodo was promoted to district representative at Lafayette from field representative at the Eunice store, and Henry H. Cooper was appointed field representative at Houma where he was formerly storeman.

In West Texas, Oilwell named Edward Dwayne Andrus field representative at Anson; J. R. Canon, field representative at Hobbs, N. M., and transferred Wylie Pressly Wright, Jr., field representative at Hobbs, to Denver City, Texas.

In Oilwell's Mid-Continent area, James R. Harris has been appointed store manager of the new Pawhuska, Okla., store. Harris was employed at the Ponca City store in 1946 as storeman and was appointed field representative there in 1951. Richard L. Pickens was named field representative at the new store.

Appointment of Gorman Terrel Horton as field representative at Greggton, Texas, and the transfer of Donald Eugene Kyle, field representative at Anson, to Gainesville, Texas, also has been announced by Oilwell.

Sadler Joins Atlas Powder As Petroleum Engineer

Thomas H. Sadler, of State College, Penn., has joined the staff of Atlas Powder Company's central research laboratory as a petroleum engineer. He has been employed by John I. Thompson and Company as an engineer.

Cleveland Trencher Announces Executive, Staff Appointments

The Cleveland Trencher Company has announced the promotion of E. B. Volmar to vice president in charge of manufacturing and the appointments of Clifford P. Morgan as sales manager and David L. Raymond as chief engineer.

Works manager for five years and an employe of the company for over 15 years, Volmar also has been elected to the company's board of directors. Morgan succeeds John A. Penote, now vice president in charge of sales. Raymond succeeds Albert R. Askue who retired recently after serving as chief engineer for over 15 years.

Before joining Cleveland Trencher, Morgan was sales manager of the Arc Welding Accessories division of Erico Products, Inc. Prior to that he was regional dealer manager for the Lincoln Electric Company. Raymond headed the Automotive Products and Contract Engineering department of the Perfection Stove Company for two years.

GUNITE COATINGS for PIPE LINES

Reinforced GUNITE COATING being applied to pipe.
Your inquiry solicited.
GUNITE CONCRETE & CONST. CO.
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3206 HOUSTON, HOUSTON 9, TEX
CHICAGO — ST. LOUIS — DENVER
MILWAUKEE & TWIN CITIES — NEW ORLEANS

Waukesha Motors Company Names John Kelly Chief Draftsman

Appointment of John P. Kelly as chief draftsman of the Engineering department has been announced by the Waukesha Motor Company. Succeeding Lloyd M. Kanters who recently retired, Kelly will be in charge of the Drafting department and other related activities.

John P. Kelly

Kelly joined Waukesha in 1946 as engineering draftsman, working on layout and design problems. Previously he had had shop experience as a machinist with the Pullman Standard Car Company.

Allis-Chalmers Establishes Six Major Operating Divisions

Allis-Chalmers Manufacturing Company is establishing six major operating divisions within the company to provide faster direct line service to customers.

Of the six divisions each headed by a general manager, three will be in the industries group, formerly known as the General Machinery division, and three will be in the tractor group, formerly called the Tractor division.

J. L. Singleton, vice president and company director, will head the industries group and W. G. Scholl, vice president and director, will head the tractor group.

J. W. McMullen, vice president, transformer and switchgear equipment, will be vice president and general manager of the Power Equipment division; P. F. Bauer, manager Apparatus department and general manager of the Norwood, Ohio, Works, will be general manager of the Industrial Equipment division. Bauer will also have the two Canadian plants of Allis-Chalmers in his division.

Heading the General Products division will be William M. Wallace, who previously was manager of the company's Processing Machinery department. R. M. Casper, previously manager of the General Machinery division, Power department, will become administrative assistant to Singleton.

In the tractor group are Farm Equipment, Construction Machinery and Buda divisions. Heading the first will be L. W. Davis, formerly Pacific Coast territory manager for the Tractor division. Boyd S. Oberlink, vice president, Tractor division, will be vice president and general manager of the Construction Machinery division; and R. K. Mangan will continue as president and general manager of the Buda division. The Buda division produces diesel and gasoline engines, material handling equipment, railroad maintenance and other equipment.

Continental Motors to Build Industrial Plant in Ontario

Continental Motors of Canada, Ltd., subsidiary of Continental Motors Corporation, will build an industrial plant on a nine-acre tract recently purchased at St. Thomas, Ontario. The factory will occupy 30,000 square feet and will be of brick and block construction, one story high. It will combine fabrication, assembly and warehousing operations. Completion is scheduled for winter.

DON'T COAT AND WRAP DIRT AND MOISTURE!

Complete absence of all dirt and moisture from your pipe, when the coatings and wrappings are applied, is essential to prevent future corrosion.

At Spi all coating and wrapping is done in clean, temperature controlled buildings. Compare these conditions with those encountered when your pipe is coated and wrapped in the field.

standard pipeprotection inc.

3000 SOUTH BRENTWOOD BLVD. • ST. LOUIS 17, MISSOURI

For more data on advertised products, use Readers' Service Cards, last page.

Texas Vitrified Pipe Company Expands Production Organization

Texas Vitrified Pipe Company and its subsidiary, The Southwestern Plastic Pipe Company, have announced expansion of the organization. Active management of the two companies is under the direction of J. F. Bailey, secretary and general manager of parent firm.

R. L. Blessing, formerly plant manager of Laclede-Christy Company's St. Louis plant, has accepted a position as production manager of Texas Vitrified Pipe Company. He will be in general charge of the manufacturing division, assisted by George Kelm, general superintendent, and Luther Waddy, chief engineer. Russell E. Stevens, formerly assistant manager, has been named controller, and David E. Clemens, general sales manager.

The Southwestern Plastic Pipe Company is managed by E. W. Hendrick, general manager, assisted by R. S. Perkins, chief engineer, and A. J. Brumbaugh, sales manager, under the general direction of Bailey.

Youngstown Veteran Named Assistant to Purchasing Director

Thomas G. Lewis, a veteran of 30 years with The Youngstown Sheet and Tube Company, has been appointed assistant to H. H. Waldschmidt, director of purchases. Lewis will supervise purchases for special projects including large construction programs.

Lewis joined Sheet and Tube in 1925 as an office boy in the Purchasing department. He became chief invoice clerk in the department in 1940; clerk in 1945 and buyer in 1946.

Bradley University Awards Rosen Honorary Degree

C. G. A. Rosen, president of the Society of Automotive Engineers, was honored recently by Bradley University in recognition of preeminence in the field of science and engineering. He was awarded an Honorary Doctor of Science degree.

Rosen has received acclaim for his part in the development of the diesel engine, having been in charge of the original Caterpillar Tractor Company program which developed a diesel engine for tractors. He is now consulting engineer to the president of Caterpillar.

Robinson Company to Build Subsidiary Plant in Houston

A new plant site has been located for the Robinson Orifice Fitting Company of Texas, Inc. on five acres on Robin Boulevard in the Houston industrial district, and a manufacturing plant and office are under construction.

The Texas corporation will manufacture orifice fittings and meter runs for distribution in the Mid-Continent and Gulf Coast territory. For over 30 years Robinson Orifice Fitting Company, Los Angeles, the parent company, was exclusive manufacturer of Robinson products.

H. K. Porter Company Purchases Vulcan Crucible Steel Company

The Vulcan Crucible Steel Company, tool steel manufacturers, has been purchased by H. K. Porter Company, Inc., and becomes the twelfth Porter division.

James O. Flower, Vulcan president, will be vice president and general manager of the new Porter division. Vulcan's branch offices are located in Chicago, Detroit and Boston, while sales representatives are in New York, Baltimore, Lansing, Mich., Milwaukee and St. Louis. The sales organization for Vulcan in the South will be from Porter's Connors Steel division, and warehouse stocks of Vulcan products will be established in Birmingham.

Vulcan's factory and offices are on an 18-acre site along the Ohio river at Aliquippa, northwest of Pittsburgh.

95% to 99%
noise energy eliminated in Gas Regulation

BURGESS-MANNING PRS SILENCERS are designed to stop nerve-wracking noise caused by pressure reduction operations in gas regulation.

The PRS Silencer in the photograph is installed in the gas regulator system of the gas mixing plant at the Lehigh Valley Gas Division, United Gas Improvement Company, Bethlehem, Pennsylvania. This regulator reduces natural gas pressures from 45 psig. to approximately 2 psig. Sound Surveys at this installation prove the PRS Silencer—

- Removes 95% to 99% of the noise energy.
- Reduces noise levels at critical outside locations by 18 to 25 db.
- Eliminates the need for expensive pipe lagging.

With PRS Silencers you *gain* in *two big* ways—

1. Pressure reduction silencing with predictable results.
2. Initial savings in installation time and material.

. . . PRS Silencers do not restrict line flow.

They can be designed for any pressure range.

They require no major modification in practice.

We offer you a specialized experience and engineering service

Ask for your free copy of engineering reports

Sound Engineering

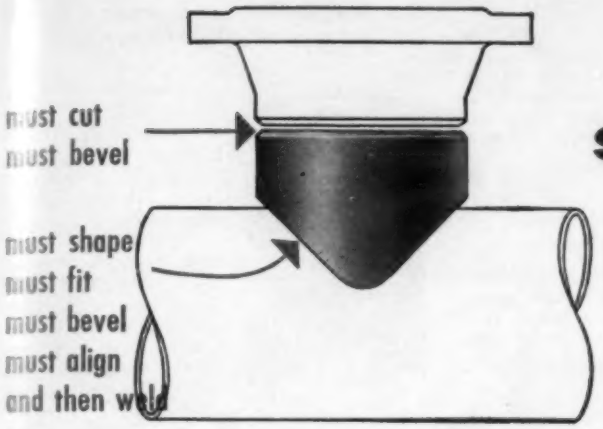
BURGESS-MANNING COMPANY

713 East Park Avenue, Libertyville, Illinois

Dallas, Texas

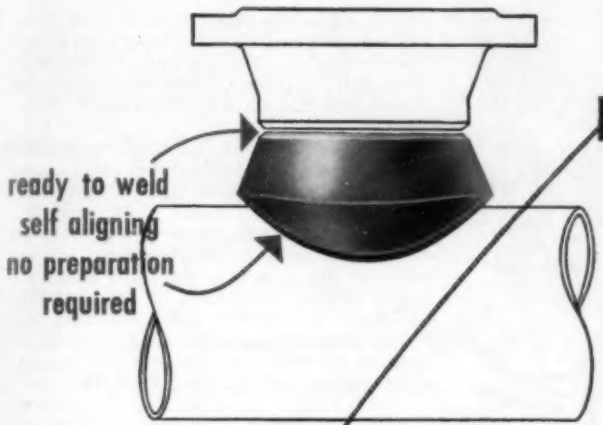
PIPE LINE INDUSTRY

"I have something that will save us money in cleaning out the line."



short nozzles

don't pay...



Bonney Weldolets

do!

Even on low pressure piping . . . avoid non-productive preparation time . . . SPECIFY and USE WELDOLETS

No joint preparation is required for *either* weld of the Weldolet, whereas considerable preparation is required for *both* welds of the miter branch construction.

The integral reinforcement of the Weldolet Welding Fitting has established it as an ideal method of constructing branch connections on high pressure and/or high temperature piping. This feature is *bonus insurance* on low pressure piping where the Weldolet is easier and more economical to use than preparing the two ends of a short unreinforced nozzle.

BONNEY

WELDING FITTINGS DIVISION

FORGE & TOOL WORKS

729 MEADOW ST., ALLENTOWN, PENNA.

For more data on advertised products, use Readers' Service Cards, last page.

Westinghouse Electric to Build Automatic Plant in Pennsylvania

A new Westinghouse Electric Corporation manufacturing plant will be built at Youngwood, Penn. To be completed by late 1955, it will be devoted to the manufacture of semi-conductor devices such as transistors, power rectifiers, high frequency detectors and photocells. Ground has been broken on a 119-acre tract of land near the New Stanton interchange of the Pennsylvania Turnpike.

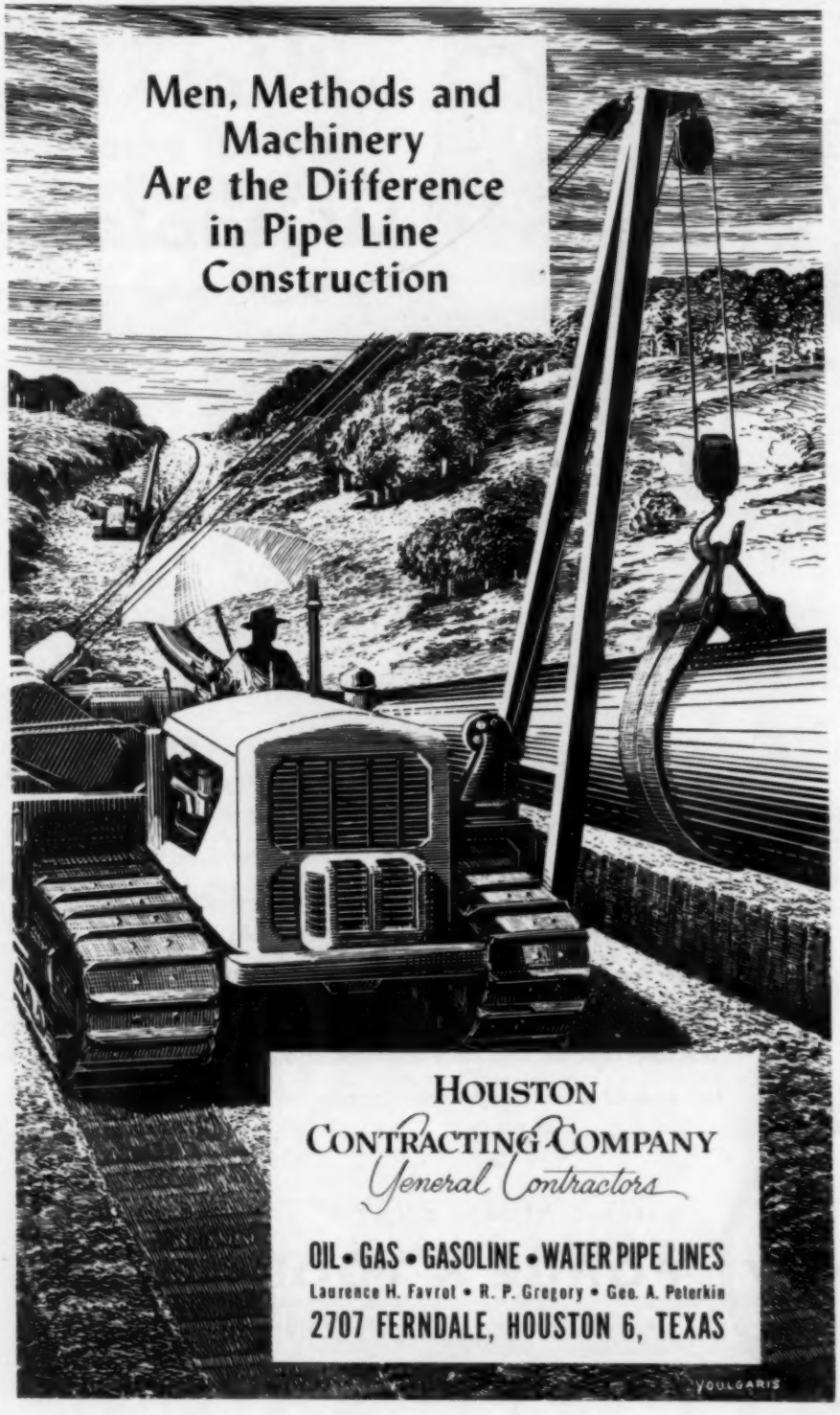
The plant will be operated by the company's newly-formed semi-conductor department. Manager of the new department and plant will be L. R. Hill.

Other appointments announced include: Dr. S. J. Angello, manager of engineering; Dr. L. L. Friend, manager of manufacturing; W. L. James, manager of sales; and C. H. Hildebrand, purchasing agent.

The new manufacturing facility will be housed in a completely air-conditioned windowless building one story high and 520 feet long. An adjacent two story office structure also will be built.

Sims Pump Valve Company Names Representative in Shreveport

John Hanks, 450 Albany Avenue, Shreveport, has been appointed area representative for Sims Pump Valve Company, Inc., of Hoboken, N. J. Hanks will service the large area including East Texas and most of Louisiana.


Men, Methods and Machinery Are the Difference in Pipe Line Construction
HOUSTON
CONTRACTING COMPANY
General Contractors
OIL • GAS • GASOLINE • WATER PIPE LINES
Laurence H. Favrot • R. P. Gregory • Geo. A. Peterkin
2707 FERNDALE, HOUSTON 6, TEXAS
YOULGARIS

Stamberger Named Manager Of Youngstown Sales District

Richard J. Stamberger, New York district sales representative for The Youngstown Sheet and Tube Company, has been appointed assistant New York district sales manager.

R. J. Stamberger

Stamberger started with Sheet and Tube as a sales trainee in 1940 and since completing the program has served as salesman in the company's Indianapolis, Columbus and Detroit district offices. He joined the New York sales office in 1952.

Youngstown Sheet and Tube Announces New Tube Mill

The Youngstown Sheet and Tube Company announces plans to build a seamless tube mill at the Indiana Harbor Works in the Chicago district. Pipe produced will range from 4½ to 9⅝-inch outside diameter.

Present tubular facilities in the Chicago area include two continuous butt weld pipe mills, an electric weld mechanical tubing mill and a conduit department.

New seamless facilities will consist of two main buildings 2000 feet long, located north of the new blooming mill and open hearth department. Each of the buildings will house both hot working and complete finishing and heat treating facilities. Features of the new seamless mill will be precision rolling and finishing equipment.

Leschen Wire Rope Moves Office to Newark

The New York district office and warehouse of Leschen Wire Rope division, H. K. Porter Company, Inc., has been moved to 219 Emmet Street, Newark, N. J.

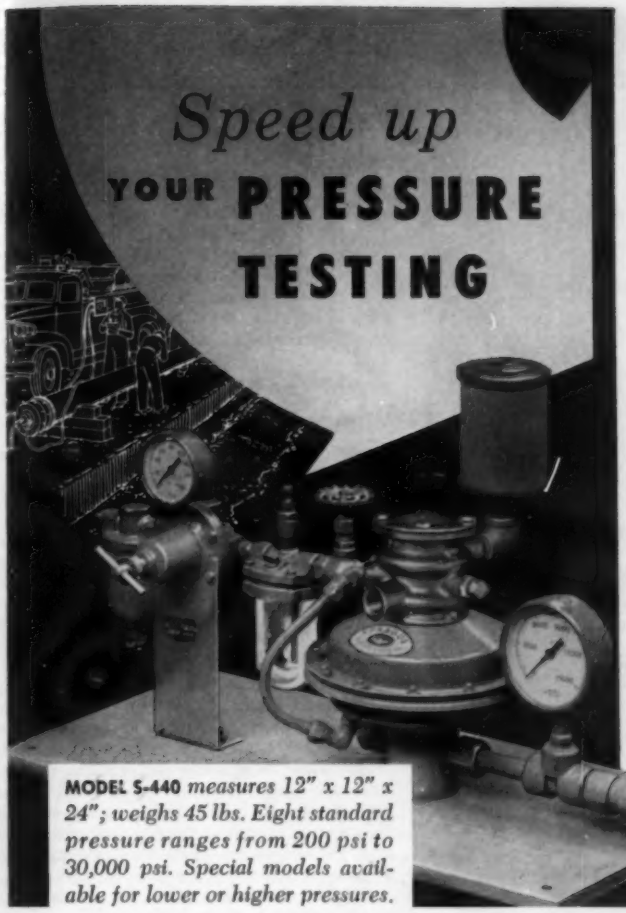
In addition to providing increased space for warehouse and shipping facilities, the new location is convenient to metropolitan New York via the Pulaski Skyway system, and is within five blocks of the New Jersey turnpike.

Fifth Microwave Radio System Completed by RCA in Arizona

Completion of a fifth microwave radio relay system which extends the microwave network now linking power stations of the Arizona Public Service Company by 500 miles has been announced by the Engineering Products division, Radio Corporation of America.

The new system provides a 175-mile communications link between installations at Phoenix and Yuma, Ariz. The Phoenix-Yuma link, which utilizes standard RCA CW-20A microwave equipment, is interconnected with four previous RCA microwave installations.

Use the Readers' Service blue post cards on the last page of this issue for more information on advertised products.



MODEL S-440 *measures 12" x 12" x 24"; weighs 45 lbs. Eight standard pressure ranges from 200 psi to 30,000 psi. Special models available for lower or higher pressures.*

This Portable Power Package will quickly build up any desired pressure in your pipe and then hold that pressure as long as required. Simply fill pipeline with water in usual manner. Then connect the S-440 to air pressure source, to water supply and to pipeline—set desired pressure—and you're in business. Some contractors report up to 1500 ft. of 6" pipe tested at one time.

Furnished with air operated pump, air muffler, air filter, air lubricator, air regulator, valves, gauges and all necessary equipment for immediate operation except required lengths of high pressure hose. Priced from $278.25 and up FOB Gardena, California. Thousands in use.

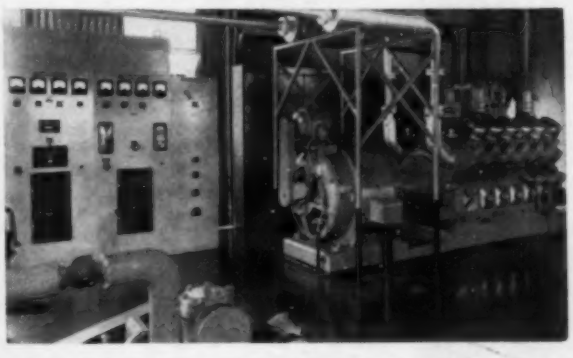
Send for bulletins.

SPRAGUE
Engineering Corporation

1144 West 135th St., Gardena, California

READY WHEN NEEDED

DEPENDABLE—EFFICIENT



These important units at a major company's gas compressor station were furnished through us. Where dependability, long life and efficient service are requirements, LeRoi Engines continue to make Oil Country history.

For 46 years Southern Engine & Pump Company has been serving industry with power units for every requirement. Skilled mechanics and competent engineers are available to serve you. We invite your inquiries.

DISTRIBUTORS

SOUTHERN ENGINE & PUMP COMPANY

MANUFACTURERS • MACHINERY FACTORS • CONTRACTORS

Service Facilities at: Houston — Dallas — Kilgore — San Antonio Edinburg — Corpus Christi and Beaumont, Texas — Lafayette and New Orleans, La.

H. B. ZACHRY CO.

General Contractors

PIPE LINE DEPARTMENT TRANSIT TOWER
SAN ANTONIO, TEXAS
Phone: CApitol 6-2472

Skill, Integrity and Responsibility

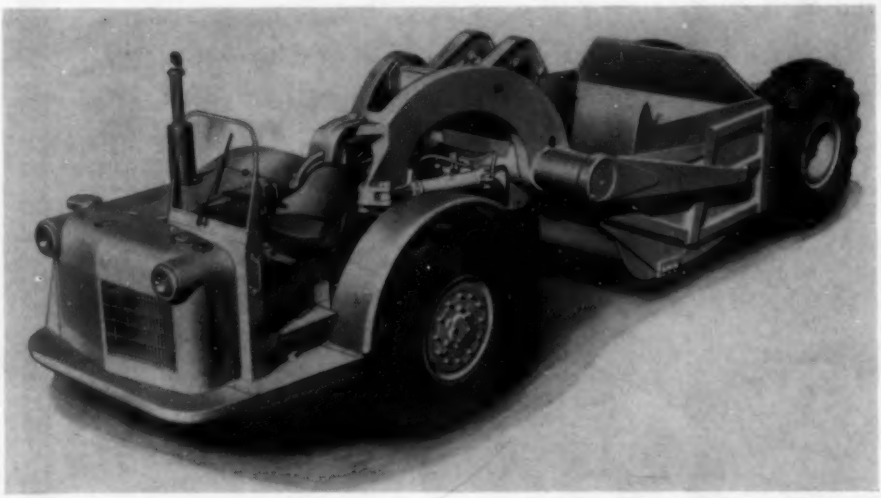
Constructors of

PIPE LINES

Oil Field Stations Electrical Installations

What's New in Equipment

for the Pipe Line Industry



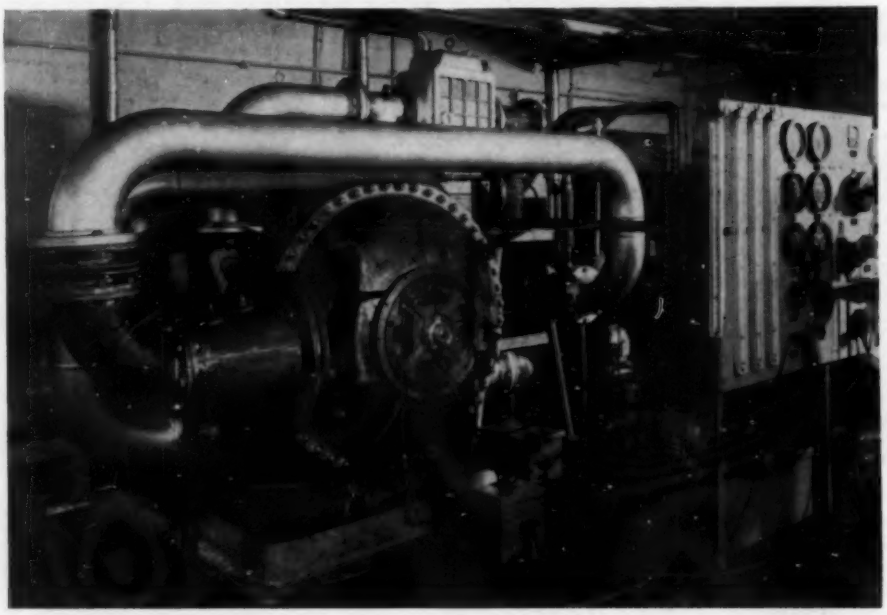
Motor Scraper

The latest addition to Euclid's line of motor scrapers, the Model S-7, is now in production. Powered by a 143-horsepower diesel with a five-speed transmission, the S-7 is the first overhung engine scraper to go into production at Euclid division of General Motors Corporation.

All scraper operations, bowl, apron and ejector, are controlled by hydraulic lever action, providing independent control and eliminating down time and expense resulting from cable breakage.

A four-section cutting edge, with each section identical, adjustable and reversible, provides the most efficient blade arrangement for any type material and gives longer blade life.

For more data circle **No. E1** on Readers' Service Card, last page this issue.



Centrifugal Compressor

A new line of centrifugal compressors for gas transmission lines, refineries and petrochemical plants has been announced by Cooper-Bessemer Corporation. The centrifugal line, which ranges in size and capacity from 500 to 65,000 CFM, is designed to augment Cooper-Bessemer's reciprocating compressors now in use.

The compressors have economic advantages where pressure ratios are low and loads and pressures are constant. When such conditions prevail, centrifugal compressors can be installed in less space and on less costly foundations.

Turbines of different types are the most favored drivers for centrifugal compressors. Steam turbines prove economical where steam is required for other purposes. Free-piston gas turbines and direct-fired gas turbines are favored when natural gas or fuel oil is available at reasonable costs. Expander turbines are being given greater consideration recently where high pressure gases are required in the process and energy can be reclaimed by expanding the gases to lower pressures.

(This item supplements Cooper-Bessemer Corporation data on Page 1275 of the Composite Catalog, 20th Edition.)

For more data circle **No. E2** on Readers' Service Card, last page this issue.

Thread Compound

For use on all line pipe threads, fittings, valves, bull plugs, nipples, hydraulic fittings, pressure gaskets and flanges, Jet Lube Inc. has introduced a new thick-or-thin sealing compound which lubricates and makes a tight pressure seal. Insoluble in petroleum oil, gas and water, it can be thickened to stiff consistency for putty knife application as a flange and gasket paste by adding water, or it can be thinned with solvent for brush or spray application.

Special chemically inert filler combined with pure metallic lead and graphite provide a matrix in thread grooves and between gasket faces to form a slightly malleable seal. A flexible but tough, polymerized film forms upon exposure but compound beneath remains non-hardening. Vibration, impact or surge will not rupture seal. Low evaporation loss resists drying action of superheated steam.

Highly resistant to all hydrocarbon products and gases, air, acids, alkalies, steam, water and chemicals, the new compound is non-toxic and will not impart any characteristic odor to water or other line products. It is non-corrosive to ferrous metals.

(This item supplements Jet Lube Inc. data on Pages 2504-2507 of the Composite Catalog, 20th Edition.)

For more data circle **No. E3** on Readers' Service Card, last page this issue.

Floating Roof

Production of floating roofs is announced by Wyatt Metal & Boiler Works who is producing three new types, the twin-deck, pontoon and pan-type designs. All are licensed under the Joor group of patents.

The roofs are of rigid design which permits only moderate deflections, assuring excellent drainage. There is no space beneath the deck where vapors may accumulate, thus lessening possibility of corrosion of deck plates.

Annular space between roof perimeter and tank shell is sealed at the oil surface by synthetic-rubber-asbestos-cloth sealing material. The sealing mechanism consists of long, heavy galvanized steel shoe plates, and a positive, mechanical expanding mechanism forcing the shoes outward against the shell with uniform pressure over the entire area of the shoe. The design generally reduces evaporation losses at the edges of the roof and lessens possibility of corrosion in the space housing the sealing mechanism.

As there are no structures above the roof deck plates, the roofs are clear and, as a result, maintenance costs are at a minimum.

For more data circle **No. E4** on Readers' Service Card, last page this issue.

Save time! Keep informed! Circle numbers on Readers' Service Cards, last page this issue.

Seal-"O"-Ring Gate Valves

Grove Valve and Regulator Company has announced that Grove seal-"O"-ring gate valves up to 36 inches for all petroleum and gas pipe line pressures have been made available through development of a new fabricated steel body design.

Full opening or venturi types are available with flanged or welding ends. The Grove through-conduit fabricated valve body provides maximum design flexibility for special applications. Standard models are listed from 2-inch to 36-inch sizes in ASA Series 150, 300, 400 and 500.

Utilizing a parallel-sided port plate with self-aligning metal seats backed up by "o" ring seals, the units maintain absolute bubble-tight seal on both upstream and downstream seats. The body may be vented or drained to provide positive indication of absolute shutoff.

Shown is a 30-inch by 24-inch by 30-inch ASA Series 400.

(This item supplements Grove Regulator Company data on Page 1880 of the Composite Catalog, 20th Edition.)

For more data circle **No. E5** on Readers' Service Card, last page this issue.

Engine-Driven Welder

A new 200-ampere engine-driven welder, for pipe line welding and construction and maintenance work, has been announced by General Electric Company Welding department. It is NEMA-rated for a current range of 40-250 amperes and will handle all d-c or a-c/d-c electrodes from 1/16-inch to ¼-inch.

Welding performance is featured by minimum load drop-off as the welder heats up, "peppy" arc and fast response, ease in arc starting and a high instantaneous recovery voltage that prevents popouts.

Generator control consists of tap switch and current rheostat which allow precise current settings without need of subsequent readjustment. There are six electrode taps, one for each electrode size.

The liquid-cooled Hercules engine operates at 1750 rpm and has a 17-gallon fuel tank which will keep the generator running over 13 hours at full-load rating, 60 percent duty cycle, on a tankful of gasoline. A vacuum-operated slowdown control with adjustable time delay lowers operating costs by reducing engine wear and gasoline consumption.

All operating parts are protected by a

HAMER BLINDS **FOOLPROOF SHUT-OFF**

chalks up substantial savings $

FOR PIPE LINE COMPANY

Oklahoma Mississippi River Products Line Inc., tank farm manifold at Drumright, Okla., employs a quantity of four different Hamer Line Blind Valves.

HAMER *Visible Shut-off* LINE BLIND VALVES

HAMER *Plug Valves*

Will not stick. Plug adjustment nut makes it easy to open or close valve yet assures positive control of the plug.

Contamination costs money. Preventing it means a healthy savings in both time and dollars. That's where Hamer Line Blinds excel. For example: Installed in Oklahoma Mississippi's Drumright, Oklahoma tank farm when it was constructed in 1951, Hamer Blinds have been on the job 24 hours a day providing a quick leakproof shut-off that's both positive and permanent. Net results—the company reports complete product segregation has resulted in substantial savings every year the blinds have been in operation.

Send for FREE Catalog

HAMER VALVES, INC.

2919 Gardenia Ave., Long Beach 6, Calif.

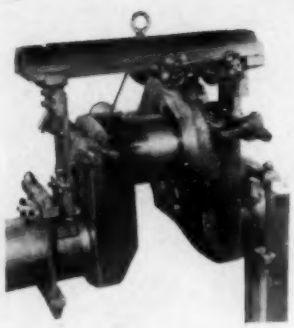
Representatives throughout the World

For more data on advertised products, use Readers' Service Cards, last page.

KINZBACH
ON THE SPOT MACHINING
Saves Time and Money

Kinzbach Portable Boring Bar

Kinzbach Crank Pin Turning Machine



A skilled Kinzbach service crew will save you money by doing turning, boring and other operations on your engines and compressors without dismantling major assemblies. The Kinzbach Tool Co. has developed special equipment to handle many pipeline, process plant and refinery repairs and has had many years of experience in this type of work.

The Crank Pin Turning Machine may be mounted on the crank shaft within the engine, thus turning the crank pin without removing the shaft from the assembly. The machine will turn from 8″ to 12″ crank pins.

The Kinzbach Portable Boring Bar will handle bore diameters from 7″ to 32″ and lengths up to 48″. This machine bolts directly into the cylinder as illustrated.

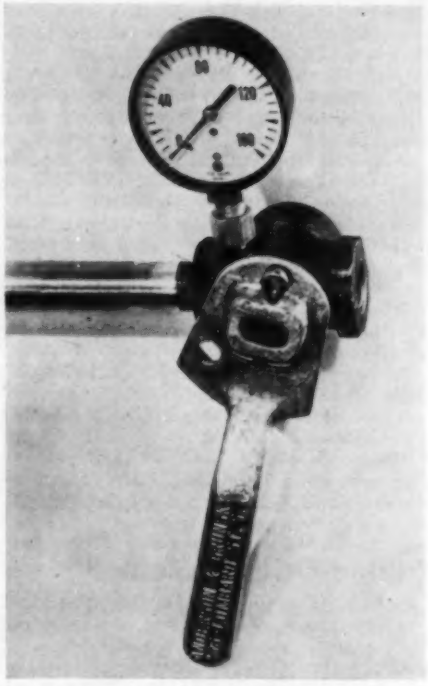
If your maintenance job falls within these ranges, it's often less expensive to have these operations done by a Kinzbach crew right at your site, rather than dismantling and shipping the machine into the shop. Special adaptations of this equipment are regularly made to fit the needs of a wide variety of special and unusual jobs. Call or write the Kinzbach Tool Company for complete information about this money-saving service.

KINZBACH TOOL CO INC

KINZBACH TOOL CO., INC.
P. O. Box 277
Houston, Texas

full-length canopy made of 16-gage steel. The welder will fit crosswise in a standard pickup truck and features a skid-type base for easy portability. Lifting and towing eyes also are provided.

For more data circle **No. E6** on Readers' Service Card, last page this issue.



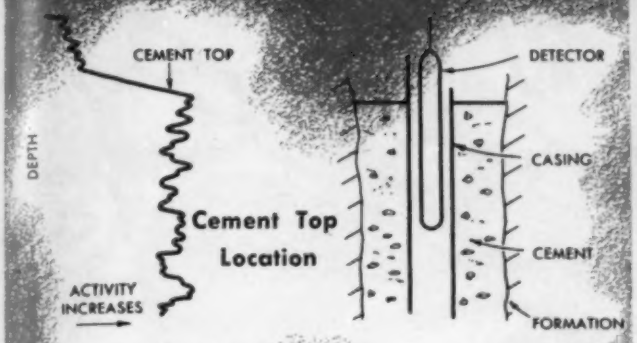
Pipe Tester

A new tool, invented by O. F. Anderson and Charles Grunsky, both of the Pacific Gas & Electric Company, is now available to test air or water pressure in light wall steel pipe or copper tubing.

Ordinarily, in testing a pipe section for leakage, it is necessary to weld caps over the ends, one cap being threaded to allow introduction of water pressure or air pressure. By inserting the Anderson test plug at each end of the pipe, however, the welding operation is eliminated. After pressure has built up within the pipe, a small Rockwell-Nordstrom lubricated plug valve assures a positive leak-proof seal at the cock. If the gage indicates loss in pressure, it means a leak in a joint or somewhere within the pipe.

For more data circle **No. E7** on Readers' Service Card, last page this issue.

BETTER RADIOISOTOPE SERVICE



another *Tracerlab* first

TRACEOIDS
and
TRACESOLS
for the
PETROLEUM INDUSTRY

Now you can apply radioactive tracers to help solve your production problems. Tracerlab . . . leader in developing radioisotopes for industrial use . . . is prepared to furnish TraceSols (gases and soluble compounds) and TraceOids (a wide variety of materials with variable density and particle size), specially developed for use in exploration and drilling operations.

TraceOids and TraceSols are useful to the petroleum industry, for example, as tracers to evaluate and control water flooding of oil fields for secondary recovery operation; to test oil well casing cement for leaks; to tag drilling mud to determine the permeability of the formation being drilled; and for many other similar operations.

These short lived compounds can be shipped from our Houston Laboratory on short notice to points anywhere in the United States, Canada and Central America.

Tracerlab's wide experience in the use of radioisotopes in industry is your assurance that TraceOids and TraceSols will help you complete your field work quickly and accurately. For your copy of Tracerlab's catalog describing TraceSols and TraceOids in detail, write today.

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So SIMPLE that "Specials" are Likely to be Standard!

A sleeve, raised and lowered within a non-magnetic tube, attracts or releases an Alnico magnet attached to a mercury switch. Basically, this is Magnetrol

MAGNETROL

The World's Most Dependable

LIQUID LEVEL CONTROL

Because of the utter simplicity of Magnetrol's magnetic operating principle, standard models can be easily adapted to meet any special requirements for pressure, temperature or corrosive liquids . . . and usually at little extra cost. This Magnetrol versatility has solved all kinds of tough level control problems . . . and given our engineers wide application experience that can be invaluable to you.

Magnetrol is so simple that failure is all but impossible! Using only permanent, unfailing magnetic force for its operation, there's nothing to wear out . . . no diaphragms or bellows to stiffen and rupture . . . no electrodes to short or corrode . . . no packing to bind or leak. Magnetrol is practically maintenance-free! Magnetrol units are available for controlling level changes from .0025-in. to 150-ft. . . . with multi-stage switching when desired. Send coupon for full details.

MAGNETROL, Inc.

Send Coupon For Full Details

MAGNETROL, Inc., 2128 S. Marshall Blvd., Chicago 23, Illinois

Please send me catalog data and full information on Magnetrol Liquid Level Controls.

Name_____

Company_____

Address_____

City_____ Zone_____ State_____

For more data on advertised products, use Readers' Service Cards, last page.

LUBRICATE PLUG VALVES
BETTER, SAFER,
AND AS MUCH AS
20-TO-1 FASTER

. . . . with
DELTA
GUNS and FITTINGS

By adapting the Delta-Desco System, one man can lubricate as many as TWENTY plug valves—while by the jack screw method a man can service only ONE. The Delta-Desco System is not only faster, but easier, safer, and more positive.

The lightweight Delta Gun offers many safety features, develops 10,000 lbs. and is tested to 30,000 lbs. pressure. Delta fittings for any lubricated plug valve, guaranteed not to leak under 15,000 lbs. pressure.

Write for catalog and prices.

The Only Complete Plug Valve Lubrication Company
DELTA ENGINEERING SALES CO.
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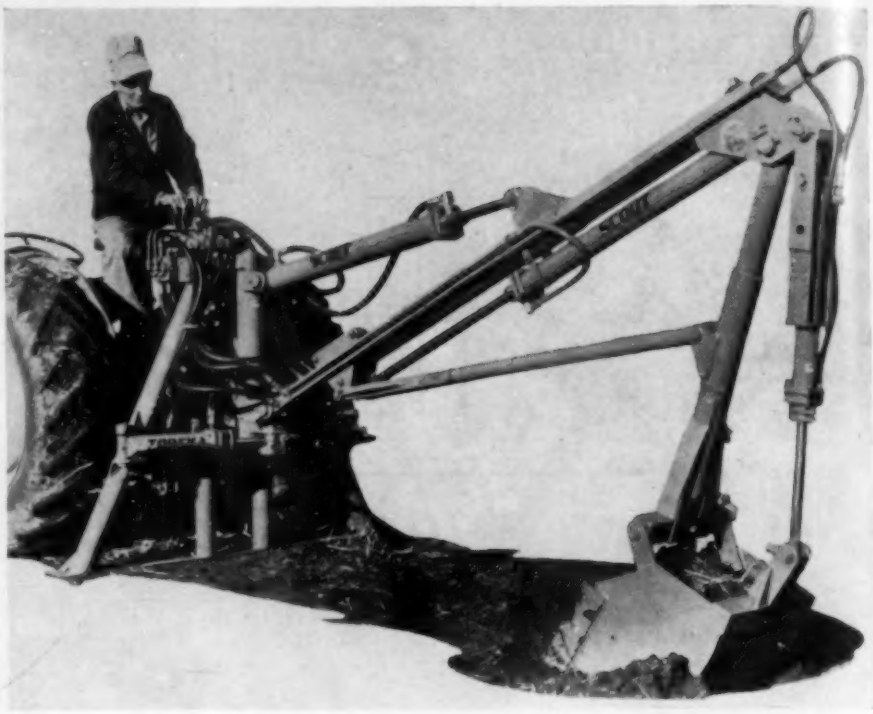
PLUG VALVE LUBRICANTS AND EQUIPMENT

LUBRICANTS FITTINGS GUNS LUBRICATORS



Digging Machine

A medium-size digging machine, the Shawnee Scout Ditcher, is now available from Shawnee Manufacturing Company. It is an industrial type ditcher designed for digging shallow trenches needed for short run pipe lines between storage tanks and for connecting tanks with a central gathering point. The new digger can be mounted on light tractors.

It operates in a 150-degree arc behind the tractor and the bucket has a reach of 14 feet behind the main A frame. Dumping clearance is 8 feet high, with a maximum digging depth of 12 feet.

Highly maneuverable, the ditcher can be operated in a small area.

For more data circle **No. E8** on Readers' Service Card, last page this issue.

Fire-Fighting Trailer

Henry H. Paris Distributor, Inc., has announced production of a completely self-contained fire-fighting trailer which carries 360 gallons of water. The 4-foot by 8-foot by 18-inch steel body has four wheels, mounted on two level load axles. Mounted on top of the trailer body are a high volume, high pressure pump, hose reel, 100 feet of one-inch high pressure hose, 150-pound dry chemical tank with 50 feet of hose, a 30-pound hand extinguisher, valves and all controls. Thirty feet of 2½-inch suction hose is carried in a special compartment at the rear of the trailer.

When drawing water from the tank, the pump will throw a stream 100 feet through the one-inch hose at 80 pounds pressure. The dry chemical tank is pivot-mounted and can be raised to an upright position and latched in place for refilling. With the valve and piping arrangement, water can be picked up from a pond, reservoir, roadside ditch or stream or directly from a fire hydrant. Water also can be taken from the sources to refill the trailer tank.

For more data circle **No. E9** on Readers' Service Card, last page this issue.

Circle numbers on Readers' Service Cards on last page

20,772 hours...2½ years of trouble-free service at Plantation Pipe Line's Akron, Alabama, Station*

...typical of

JOHN CRANE 8-B

SEAL PERFORMANCE

*Case History

"John Crane" Type 8-B Seals were installed in two high pressure 3-stage centrifugal pumps at the Akron, Alabama, Station, operated by Plantation Pipe Line Co. Pumps operated for 2½ years without shutdown. At the end of that time they were opened for inspection and parts repair. The seals, including rubber parts, were in perfect working condition. New 8-B Seals were ordered to insure repetition of this remarkable performance record. Old ones were rebuilt to serve as spares.

Here is further proof that wherever service is tough "John Crane" 8-B Seals are successfully doing the job. This is the reason why 75% of the seals installed in crude and product pipe lines within the last several years have been "John Crane" Seals.

You can get this same performance. Contact Crane Packing Co., 1834 Cuyler Ave., Chicago 13, Ill. *In Canada: Crane Packing Co., Ltd., 617 Parkdale Ave., N., Hamilton, Ont.*

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SAND-BANUM

Pure Colloidal Concentrate
OUNCES ONLY ONCE A WEEK
Remove and Prevent
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Eliminate Metal Corrosion with SABCO

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TRANSMISSION LINES
DISTRIBUTION SYSTEMS

SOMERVILLE CONSTRUCTION COMPANY
ADA, MICHIGAN

NEW EQUIPMENT . . .

Chain Wrench

A new design in chain wrenches has been announced by Reed Manufacturing Company. The chain-and-jaw permits working in tight corners, between parallel pipe lines, or wherever there is too little clearance for the head of a conventional wrench. It is also possible to tighten and back off a pipe or fitting without taking the wrench from the pipe or changing the setting. Jaws of the wrench are of hardened steel designed to permit a fast, ratchet-like action in either direction from either side of the pipe or fitting.

The wrench is offered in 10, 14, 18, 24 and 36-inch lengths. Additional chain has been provided in the 14-inch model to give a holding capacity up to four-inch diameter.

For more data circle **No. E10** on Readers' Service Card, last page this issue.

Tubing Harness

A new chemically-resistant tubing harness composed of ten individual copper or aluminum tubes in a perforated-plastic covering is now in production at Dekoron Products division of Samuel Moore & Company. Construction enables one or more individual tubes to be stripped from the ribbon without tools and without destroying the protective coating.

Since the plastic coating, .020-inch virgin elastomeric black polyvinylchloride, is chemically resistant, the Dekoron ribbon eliminates frequent instrument tubing replacement. Standard tube OD'S are ¼-inch with .030 copper or .032-inch aluminum wall tubes, and ⅜-inch with .032 copper or .035-inch aluminum wall tubes.

For more data circle **No. E11** on Readers' Service Card, last page this issue.

Air Compressor

Schramm, Inc. has announced a new low-priced, self-propelled air compressor known as the Standard Pneumatractor. It has the same 125 c.f.m. engine-compressor power plant as used in the company's Heavy Pneumatractor and Pneumapower portable compressor built into a self-propelled tractor unit.

The new compressor saves the expense of towing or hauling, saves man-hours in moving about on the job and the extra cost of a tractor on the job for pulling other equipment.

For more data circle **No. E12** on Readers' Service Card, last page this issue.

See Composite and Refinery Catalogs, or Write for Specifications Folder

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PIPE SADDLES AND REDUCERS

Nozzle sizes from ¼" to 24"

ASTM A234

Also for pressure vessel heads

Special sizes and lengths. Schedules 10 to 160 Stainless Steel, and other Alloys.

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There's none better for SPEED, SAFETY, POWER, ACCURACY and ECONOMY. It eliminates dangerous sparks . . . broken cutters; rollers hold pipe taut after cutting. It's easy on and off pipe . . . will cut 10" pipe in 12 min. Patented roller guides. Rachet makes it easy to work in close places.

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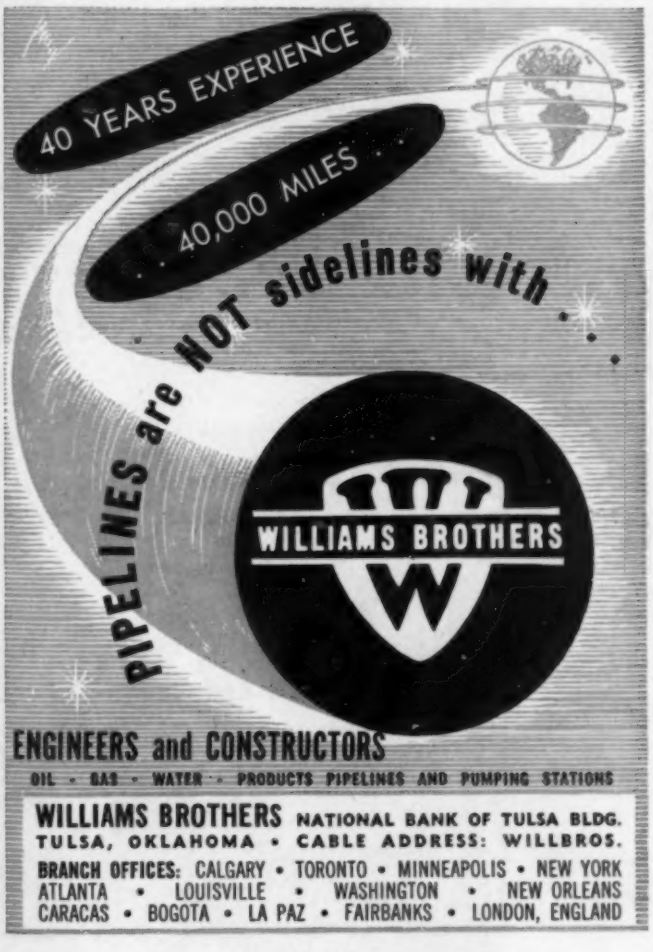

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CURTIN CENTRIFUGES

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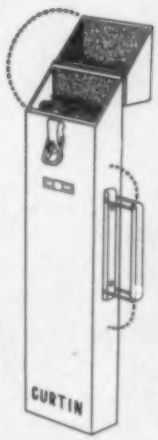
. . . with CURTIN'S
New 3-Place HYDROCASE



No. 10903-3

Specially designed to carry three Plain or Combined Long Form Hydrometers.

- Accommodates three hydrometers of various lengths up to 406 mm. (16¼"). Maximum length meeting API and ASTM specifications is 400 mm. (16 inches).
- Constructed of lightweight, Extruded Aluminum.
- Lid secured by long lasting, full-length piano hinge and positive tension-type latch with provision for padlock.
- Sturdy carrying handle folds compactly against case when not in use.
- Unique design practically eliminates the possibility of hydrometers slipping out when lid is accidentally left unlatched and case is carried in normal position.
- 45° angle cut of lid affords ample room for easy insertion or removal of hydrometers; also prevents hydrometer breakage when lid is opened or closed.
- Lid serves as stand for case when fully opened and case placed in horizontal position.
- Each hydrometer protected within a separate, rigidly reinforced felt-lined cylindrical aluminum compartment.

Write for bulletin 53

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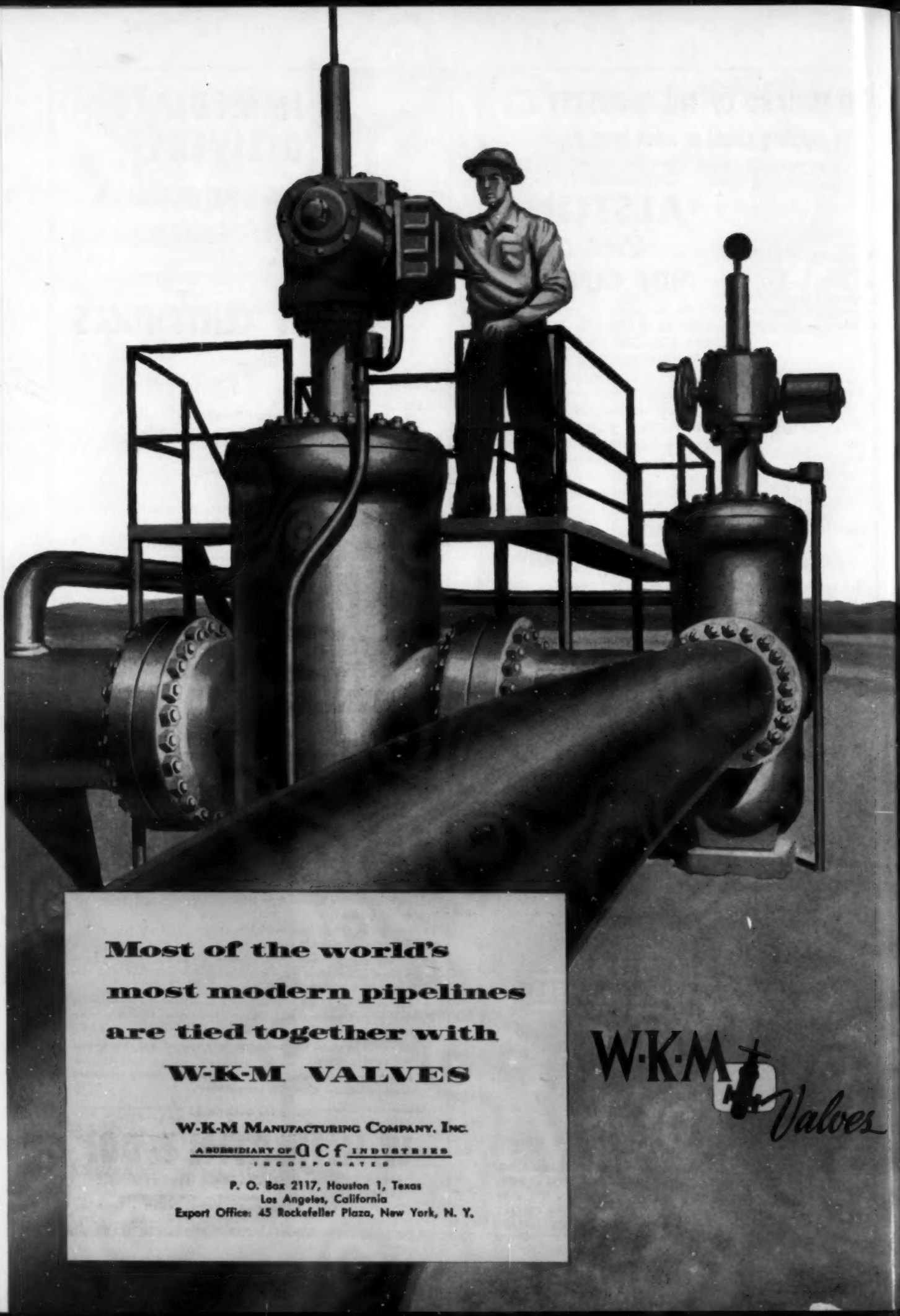
BIRMINGHAM • CORPUS CHRISTI • TULSA



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W-K-M Valves

New Equipment Literature

For more data on New Equipment or copies of Catalogs and Literature reviewed in this issue, use the Reader Service postcards just inside the back cover and facing the Advertisers Index. Simply circle code numbers of items desired—sign and mail card.

Hose and Fittings Catalog

Rubber-covered single fiber braid (non-metallic) hose for low pressure service and brass re-usable fittings have been announced in a catalog recently published by Parker Appliance Company. Incorporating a high tenacity rayon ply, the hose is used in service with hydraulic fluids, water, crude and fuel oils, hot oil, diesel fuels, gasoline and air.

Detailed information on Parker fittings are also included in the catalog. Sizes for ¼, ⅜, ½ and ⅝-inch inside diameter hose are available in three body types, 45 degree flare end, 45 degree flare swivel nut and male pipe thread.

To get a copy circle **No. E13** on Readers' Service Card, last page this issue.

Coatings Literature

Royston Laboratories, Inc., manufacturers of protective coatings and related items, has released a folder containing nine pieces of literature on their various products. The folder is designed to fit standard file drawers for handy reference.

Literature on Royston colormastics, pipe storage primer, vinachrome primer and endseals are included, plus folders and leaflets on Royston's Roskote cold-applied mastic Roylac aluminum coating, A-36 primer, Orco tape insulation and Roskoter, Royston's new pipe line coating device.

To get a copy circle **No. E14** on Readers' Service Card, last page this issue.

Moving Unit Brochure

A unit that moves more material at less cost per yard or ton on many types of jobs and under difficult conditions is described in a new booklet, "Low Cost Producers" published by Caterpillar Tractor Company.

In the booklet are testimonials from owners of the units as to performance with large loads and various materials. Illustrations of four-wheeled tractors equipped with scrapers and wagons being used for loading, hauling and controlled dumping on a variety of jobs throughout the world are included.

To get a copy circle **No. E15** on Readers' Service Card, last page this issue.

Grating Manual

A data and specification manual covering all types of grating, open steel floor armor, stair treads, vessel liners, bridge decking and drain grates has been published by the Klemp Metal Grating Corporation. Including all information and data vital to the engineer, the book was designed for use as a "tool" for the construction, oil, traffic, building, chemicals, transportation, safety, heavy equipment, petroleum and maintenance industries.

The publication contains safe load tables for all basic types of gratings, panel width constant charts, tables on standard widths and types of steel stair treads most frequently used, types of anchors used for grating, use of grating and its allied products in industry and the oil and chemical fields, tables on bridge decking and various types of drain grates.

To get a copy circle **No. E16** on Readers' Service Card, last page this issue.

Compressor Bulletin

A new engineering bulletin describing the latest V-Angle engine-driven compressor has been released by The Cooper-Bessemer Corporation. The compressor, Model GMXD, is the type used in field gathering operations, in refineries and petrochemical operations.

The bulletin provides technical data on the latest developments in compressor design for further improving fuel economy and increasing capacity and range of operation. Available in 4, 6, 8, 10 cylinders of 9¾-inch bore and 10½-inch stroke, the GMXD compressor develops 265 to 660 horsepower at 450 rmp. The compressor is designed for mounting on permanent concrete foundation or can be furnished with skids as a complete packaged unit.

To get a copy circle **No. E17** on Readers' Service Card, last page this issue.

Cutting Machine Bulletin

A bulletin on a new speed-cut abrasive cutting machine has been published by Beaver Pipe Tools, Inc. Featuring both the No. 14 (bench type) and No. 20 (floor type) models, the bulletin includes data on length of cutting time for various shapes and types of materials, a general description of both machines, discussions of capacities and statements from satisfied users.

To get a copy circle **No. E18** on Readers' Service Card, last page this issue.

Air-Cooled Compressor

Ingersoll-Rand Company has recently published a bulletin describing its Model 20T compressor equipped with the Ingersoll-Rand channel valve. The air-cooled 20-horsepower compressor may be either direct-connected or belt-driven. The bulletin includes cutaway views and a table of specifications.

To get a copy circle **No. E19** on Readers' Service Card, last page this issue.

Butterfly Valve Booklet

Builders-Providence, Inc., Division of B-I-F Industries, Inc., has issued a new color bulletin on the tight-closing rubber-seated butterfly valves, Model BV.

In addition to photos and drawing of the valves, there are major sections on valve operators, a description of butterfly valve components, sizes, pressures and velocities.

To get a copy circle **No. E20** on Readers' Service Card, last page this issue.

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HOLDS PARAFFIN IN SUSPENSION
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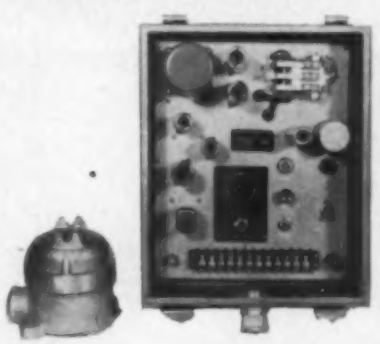

MODEL 4A VIBRASWITCH

The Model 4A Vibraswitch is designed to protect large motors, centrifuges, pumps, turbines and other heavy equipment against damage in the event of excessive vibration. Many control features available to meet specific applications.

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NOTICE: Specify **PELCO** Welding Saddles

No change except the corporate name. We still have the same ownership, same management, same address, same telephone, and use the same 45 years of experience to render the same service under the same trade name—"PELCO."

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SEE YOUR NEAREST SUPPLY HOUSE

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For the Pipeline Industry

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THE CONTINENTAL SUPPLY COMPANY
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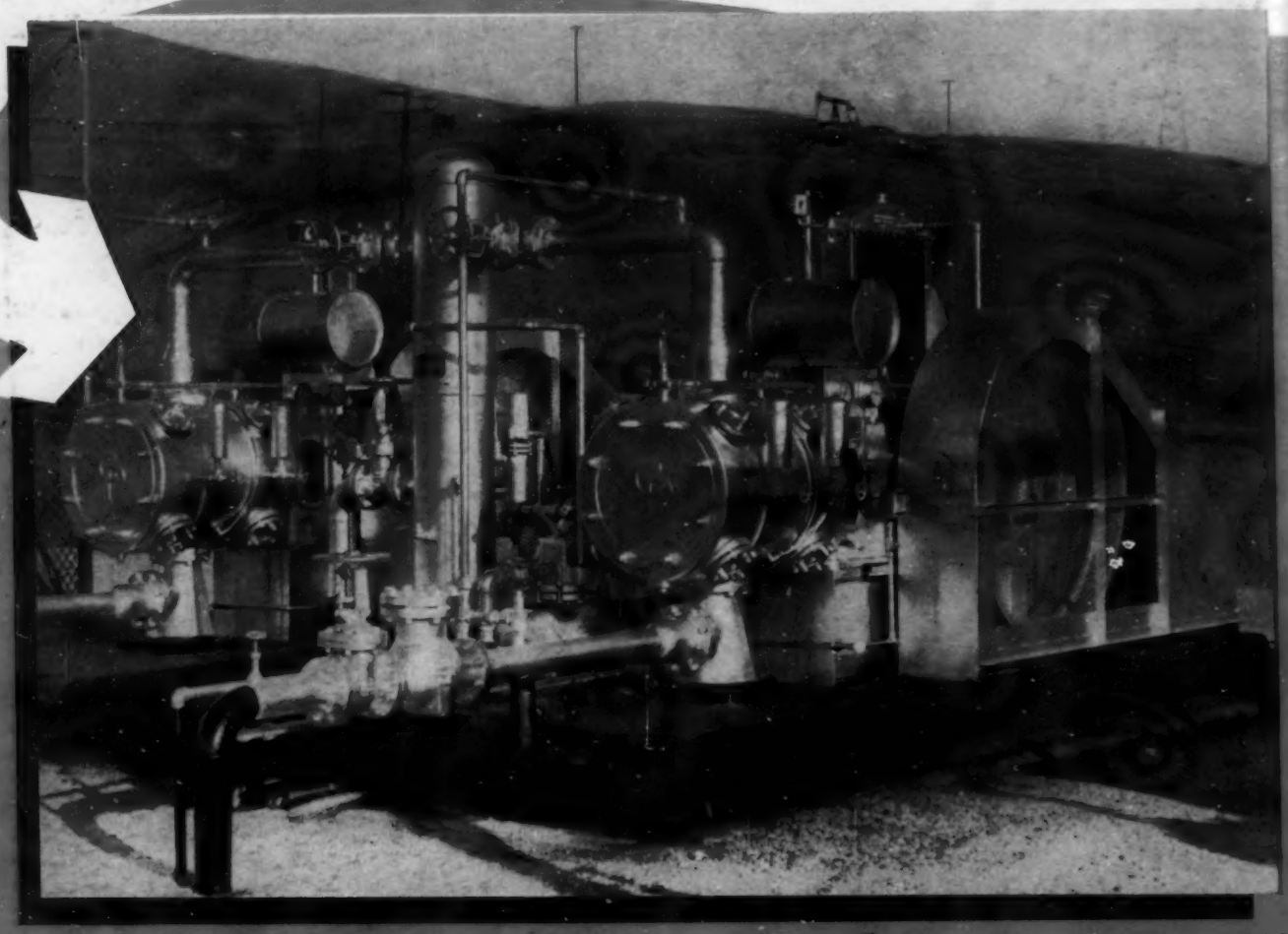
Representatives In All Principal Oil Fields of the World

These "Oilwell" Compressor Units are SAVING Storage Tank Vapors



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The engineers of Shell Oil Company knew that the value of the vapors lost from light oil storage tanks would repay the cost of a vacuum system.

So they worked out a hook-up on one of their field tank farms near Brea, California, where a gas trap is installed, in which the two 75 hp "Oilwell" Compressor Units (shown above) would draw off the tank vapors. Both units are skid mounted side by side and take suction on a common line through the scrubber.

From 10" to 15" vacuum is being pulled and gases are now being recovered at the rate of 400,000 to 700,000 cubic feet per day.

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